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Comparing the clinical profile of non obese children with sleep apnea and snoring

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Abstract

Few studies in the literature have looked into the cardiovascular and metabolic effects of Obstructive Sleep Apnea Syndrome (OSAS) in children.

Objective: This study aims to evaluate the metabolic profile of non-obese children with OSAS.

Methods: Fifty-two children were enrolled in this study, 21 girls and 31 boys. Patients were divided into two groups: OSAS (28 children) and Snore (22 children) according to polysomnographic evaluation. All children were submitted to ENT examination, measurements of weight, height and blood pressure. Blood samples were tested for hemoglobin, hematocrit, fasting glucose, fasting insulin, triglycerides, total cholesterol, HDL, LDL, VLDL, TSH and T4. The gathered data sets were compared between groups and also within the OSAS group according to the severity of the syndrome.

Results: The children from both groups had no alterations in blood pressure levels. The results of the blood tests were normal for both groups. Results of hemoglobin, hematocrit, and HDL were all significantly higher in the Snore group when compared to the OSAS group; by their turn, VLDL levels were higher in the OSAS group. There was no statistical difference between the groups based on OSAS severity.

Conclusion: Non-obese children with OSAS present no significant alterations in metabolic tests or blood pressure levels.

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INTRODUCTION

Obstructive sleep apnea syndrome (OSAS) is a respiratory sleep disorder that affects adults and children. It is characterized by repeated episodes of upper airway obstruction accompanied by intermittent hypoxia and hypercapnia[1].

Prevalence rates reported in the literature range between 0.7% and 3%. Incidence rates peak among preschoolers, as this age group is more affected by adenotonsillar hypertrophy, the main cause of OSAS in children[1]. The treatment of pediatric OSAS is adenotonsillectomy or, in rare cases, CPAP[1-3].

OSAS may have severe clinical consequences such as cor pulmonale, in addition to other cardiovascular and metabolic disorders, delays in weight and height gain, facial and chest skeletal alterations, nocturnal enuresis, behavior and learning disorders, and cognitive impairments[1,4].

The association between OSAS and systemic high blood pressure and other cardiovascular and metabolic diseases has been well documented[1,5-8]. Sleep disorders and intermittent nocturnal hypoxemia in combination with OSAS have been related to metabolic disorders including altered glucose metabolism and dyslipidemia. Evidence suggests an association between OSAS and diabetes mellitus type 2, glucose intolerance, and insulin resistance[9].

Studies in pediatric populations have shown an association between OSAS and alterations in systemic blood pressure levels[10,11], echocardiographic findings[12,13] and insulin resistance[14,15]. These alterations seem to be present mainly in children with moderate to severe OSAS and in obese kids[16]. Only a few studies have looked into the consequences of OSAS in non-obese children.

This study compared the clinical profiles of non-obese children with OSAS and primary snoring.

METHOD

The study was approved by the Research Ethics Committee of the institution and granted permit CEP 1814/08. Pediatric patients seen in an outpatient setting between March of 2009 and August of 2010 were enrolled. The subjects were aged between three and 13 years and were predominantly mouth breathers. They had been snoring three or more days per week for at least six months and had a body mass index (BMI) equal to or under the 95th percentile based on age and gender. Obese and diabetic subjects and individuals with cardiovascular, metabolic or neuromuscular diseases, genetic syndromes or craniofacial malformations were excluded.

The patients underwent complete ENT examination and had their weight, height, and blood pressure (BP) measured . BP was measured with the patients seated after resting for at least 20 minutes. A proper cuff for the patients' age and weight was used. BP measurements were categorized as 'altered' or 'unaltered' in accordance with the second release of the table published by the *National Task Force on Hypertension of the National Heart, Lung and Blood Institute* endorsed by the American Academy of Pediatrics in 1987 and reviewed in 1996[17,18]. Systolic or diastolic BP values under the 90th percentile were considered normal.

Tonsillar hypertrophy was categorized in four degrees as per the scheme proposed by Brodsky[19], while pharyngeal tonsil hypertrophy was assessed through nasopharyngeal endoscopic examination. Grades III and IV were considered as obstructive palatine tonsil hypertrophy. Obstruction caused by the pharyngeal tonsil was characterized when it occupied 70% or more of the cavum area.

All subjects underwent polysomnography. Obstructive apnea was characterized as the presence of inspiratory effort in the absence of airflow for at least two respiratory events. Hypopnea was defined as a reduction of at least 50% in airflow amplitude in the presence of inspiratory effort and oxyhemoglobin desaturation of at least 4%, or the subject awakening. The apnea hypopnea index (AHI) was defined as the set of obstructive and mixed (central and obstructive components) apnea and hypopnea episodes per hour of sleep[20]. OSAS was defined as the presence of AHI ≥ 1. If AHI ≥ 1 and < 5, the patient had mild OSAS; if AHI ≥ 5 and < 10, the subject had moderate OSAS; severe cases had AHI ≥ 10.

Fasting blood samples were taken to assess hemoglobin (Hb), hematocrit (Ht), fasting glucose, fasting insulin, triglycerides, total cholesterol and cholesterol fractions (HDL, LDL, VLDL), TSH and free T4 levels.

Non-parametric tests were used in this study.

The test for equality of two proportions was used to compare whether the proportions of responses of two variables and/or their levels are statistically significant. The Mann-Whitney test was used to compare variables from independent samples two by two. The Kruskal-Wallis test was used to compare the three degrees of OSAS severity to all quantitative variables.

Spearman's rank correlation ratio was used to measure the correlation between all variables and the OSAS degree of severity. The correlation test was used to validate the correlations.

Significance was set at 0.05 (5%). All confidence intervals used in this study had a 95% statistical confidence level.

RESULTS

Fifty-two children were enrolled in the study, 21 (40.38%) of them being girls and 31 (59.61%) boys. The patients were divided into two groups: OSAS (AHI ≥ 1 event per hour) and Snoring (AHI < 1 event per hour). Both groups were homogeneous in terms of gender and age. Twenty-eight children were included in the Snoring