Sleep science

TYPE OF DENTAL OCCLUSION IN CHILDREN AND ADOLESCENTS PRESENTING SLEEP DISORDERS

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ABSTRACT

Objective: To carry out a retrospective evaluation on the characteristics of dental occlusion in children and adolescents who were referred for polysomnography due to complaints about snoring and sleep disorders.

Subjects and Methods: In the present descriptive study, out of the 101 patients who were referred for polysomnographic evaluation (PSG), 60 patients (45 male and 15 female) were consecutively evaluated. The instruments used in the evaluation were clinical data, medical records, and PSG.

Results: The sample average age was 9.2±4.7 years, and the BMI was 21.0 ± 7.7 kg/m2. According to the PSG, the population evaluated showed the following sleep abnormalities: OSAS was detected in 65% (n=39) of the subjects, snoring in 18.33% (n=11), and contractions of the mentonian region muscles in 26.66% (n=16). According to the clinical evaluation, 49 of the patients showed oral breathing; Class I occurred in 21.66% (n=13) of the patients, Class II in 68.33% (n=41), and Class III in 10% (n=6). A significant correlation was observed between OSAS, and Class II (p=0.05) and between OSAS and Class III (p=0.009).

Conclusion: According to the methodology applied, it was found that, in children and adolescents evaluated in the present study, a significant correlation between OSAS and dental occlusion type Class II could be observed. Considering the limited number of subjects included in the sample, prospective studies with larger samples should be conducted.

Keywords: Oral breathing; Malocclusion; Sleep disorders; OSAS; Disordered breath during sleep.

INTRODUCTION

Among the sleep disorders, the obstructive sleep apnea syndrome (OSAS) should be highlightened. This is a complex multifactorial condition generated by a combination of anatomical and physiological factors and also considered a risk factor for cardiovascular diseases (1,2). Among such factors, those related to the face skeletal morphology should be pointed out (1). This is proven by the good performance of orthodontic appliances used by children showing sleep disorders (3,4) particularly nonobese children (5). Such appliances also normalize cardiovascular alterations related to the neurovegetative system (6) except in the case of sleep bruxism, whose etiology is different and not yet well known (7).

OSAS is considered a public health problem, and it is currently underestimated, particularly in children having orthodontic problems or craniofacial abnormalities (8).

Children with nasopharyngeal obstruction usually develop a certain level of alteration in the facial morphology and in the mandibular growth, depending on the severity of the problem and the time of the disease onset (9,10). Oral respirators tend to narrow the pharynx due to a poor craniofacial development and may cause OSAS (11,12). Snoring is another abnormality frequently shown by these patients (10,13).

Cephalometry performed in children carrying OSAS shows different craniofacial characteristics, such as maxilomandibular micrognatia and/or retrognatia, commitment of facial vertical development, and reduction in the posterior airway space (14). Studies conducted with patients in orthodontic clinics show that OSAS diagnosis seems to be related to cross bite, anterior open bite, and absence of labial sealing, although no predictive pattern exists (15,16). On the other hand, the sheer evaluation of the facial profile cannot always predict respiratory abnormalities related to sleep (17).

Enlargement of the palatine and pharyngeal tonsils is also a problem frequently found in othorhinolaryngology clinics and is considered the main cause of OSAS in children (18). Incidence of structural alterations in the nasal cavity, such as nasal septal deviation and hypertrophy of the inferior nasal cornets, is quite common among such patients and should be approached concurrently.

Despite the relevance of the problem, so far only a few studies on the orthodontic characteristics of patients who complain about sleep disorders have been conducted in our community. Thus, the present retrospective and descriptive study aimed at evaluating dental occlusion in children and adolescents who were submitted to polysomnography (PSG) due to their complaints of sleep disorders.

CASUISTICS AND METHOD

A retrospective analysis of the registers concerning children and adolescents who were submitted to PSG was conducted at Sleep Institute linked to the Universidade Federal de São Paulo in order to assess respiratory disorders (in view of complaints about snoring and sleep disorders) in the period from January to December 2003.

Exclusion criteria: children and adolescents carrying craniofacial malformations or neurological disorders or those who were regularly submitted to PSG for treatment control.

The assessment included the following:

a) Analysis of medical records on clinic of origin and prior clinical diagnoses;

b) General data: age, sex, weight, height, and body mass index (BMI);

c) Type of dental occlusion, which was based on molar and canine relationships (Angle's classification), and

d) PSG, which was performed with the use of a device adequate for collecting sleep variables; such variables were then recorded through a computerized sleep amplifier and preamplifier systems (Sonolab Meditron, São Paulo-BR) with a sampling frequency of 256 Hz/s per channel.

Data analysis

Data are shown as average and standard deviation. Clinic parameters (BMI, Angle's classification, and oral breathing) were correlated with data obtained from the PSG (apnea, snoring, and mentonian region muscles) by applying Chi-square tests (Fisher's exact test for short frequencies). OSAS and snoring were considered separately and evaluated based on the criteria previously described (AASM, 2005). Electromyography of the mentonian region (EMG) was utilized to evaluate the contractions of orofacial muscles.

RESULTS

Out of the 101 children and adolescents who were submitted to PSG in the period of study, 60 (45 male and 15 female) complied with the inclusion criteria. The average age was 9.2±4.7 years, and the average BMI was 21.0±7.7 kg/m2.

Based on PSG results, the patients showed the following sleep abnormalities: OSAS in 65% (n=39), snoring in 18.33% (n=11), and increase of EMG of the mentonian muscles in 26.66% (n=16).

The dental evaluation showed that 49 patients showed oral breathing; within that type, Class I occurred in 21.66% of the patients (n=13), Class II in 68.33% (n=41), and Class III in 10% (n=6).

Despite the small number of patients evaluated, statistically significant correlations could be found between OSAS and Class II and between OSAS and Class III. Data related to frequency and correlations are shown in Table 1.

Table 1 – Table of frequencies and correlations of clinical and polysomnographic data concerning children and adolescents who complain about sleep disorders.

	OSAS n = 39	Snoring n = 11	Increase of Mentonian EMG n = 16	Oral breathing n = 49
Class I n = 13	(n=08) p= 0.77(X2)	(n=02) p=0.55	(n=03) p=0.52	(n=10) p=0.62
Class II n = 41	(n=30) p=0.05	(n=07) p=0.71	(n=11) p=0.97	(n=33) p=0.73
Class III n = 06	(n=01) p=0.02	(n=02) p=0.30	(n=02) p=0.51	(n=06) p=0.22
Oral breathing n = 49	(n=30) p=0.20	(n=11) p=0.08	(n=12) p=0.89	———
Increased of Mentonian EMG	(n=10) p=0.80	(n=01) p=0.14	———	———

Chi-Square Test (Fisher's Exact Test when necessary).

DISCUSSION

The significant correlation existing between complaints about obstructive sleep apnea syndrome and dental occlusion Class II (p=0.05) corroborates the importance the scientific literature gives to orthodontic problems. The dental arch morphologic characteristics are closely related to clinic disorders (e.g., oral breathing coupled with sleep-related breathing disorders (8). The careful evaluation of dental occlusion or craniofacial problems helps OSAS prognosis (5) in addition to correcting or preventing other dental problems. Today, the effectiveness of oral appliances to control OSAS cannot be denied (4), particularly when the severity of the problem and the presence of associated morbidities, such as obesity, are taken into consideration (14). In addition, there is the fact that patients having oral breathing concomitantly show an anterior open bite and/or mandibular retrognathism and are thus more susceptible to OSAS (13).

It is known that orofacial abnormalities lead to pharyngeal obstruction and may be detected by cephalometry (15). It is also known that differences between cephalometric data referring to patients with OSAS and the healthy population have been detected (16). The cephalometric analysis is considered an important method for evaluating craniofacial characteristics, and it also provides data on posterior airway space, tongue length, and position of the hyoid bone, whose condition may contribute to OSAS (15). Nevertheless, these examinations were not the objective of the present study; its main purpose was to conduct a clinical evaluation of the dental arches, which is a relatively simple procedure for an initial assessment. Studies of this nature are absolutely necessary to alert practitioners, physicians and dentists, as well as public health authorities, on the relevance of the problem.

Since this is a retrospective study and no independent electrodes were used to evaluate the masseter muscles, sleep bruxism rates have not been evaluated (BS) (19). Data on the mentonian region are not adequate to evaluate BS. However, it is interesting to observe that BS is another movement abnormality also common in childhood (20) and may be related to OSAS (21). Occlusion factors have been the object of many studies on bruxism etiology, but today it is known that the origin of sleep bruxism is predominantly central (22). In the present study, we found that some family members had complaints about such a disorder, but data with respect to this issue have not been evaluated. The mentonian region EMG is usually utilized to evaluate muscular contractions and is not adequate to evaluate BS. However, in the present study, it did not show any statistical association with the type of dental occlusion ($p=0.52$, 0.97, and 0.51 for Classes I, II and III, respectively).

The present study, though having limitations due to the fact that it is a descriptive study and was conducted with a reduced number of subjects, is quite relevant because it is one of the first to be developed in our community that tries to quantify the clinical relationship that exists between dental occlusion and sleep disorders in children and adolescents. Prospective studies should be developed with a larger number of individuals in order to define the correlations that exist among different types of sleep disorders, oral breathing and type of dental occlusion.

CONCLUSION

As per the methodology applied in the present study, it was observed that non-treated children and adolescents framed into Class II profile show greater predisposition to OSAS when compared to those framed into Classes I and III profiles. However, it is important to take into consideration the reduced number of individuals who participated in this sample, and studies with larger samples should be conducted for confirmation of the results obtained in the present study.

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