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Original Article

The relationship between bruxism, sleep quality, and headaches in schoolchildren

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Abstract. [Purpose] Present study aimed to evaluate the relationship between sleep bruxism and headache in school children. [Subjects and Methods] This study was conducted with 103 children aged 3–6 years. The exclusion criteria were early tooth loss, dental appliance was used, physical or psychological limitations, chronic disease and continuous medication. Sleep bruxism was diagnosed based on an indication by parents of the occurrence of teeth clenching/grinding and incisor/occlusal tooth wear, following the criteria of the American Academy of Sleep Medicine. Sleep quality was evaluated by a questionnarie, detailing the child's sleep characteristics. [Results] Forty-nine children (47.6%) were diagnosed with sleep bruxism. Those with sleep bruxism were 3.25-fold more likely to present headache. Children whose parents were separated had a significantly greater frequency of sleep bruxism and primary headache. The relative risk of exhibiting primary headache was 13.1 among children with sleep bruxism whose parents were separated. [Conclusion] Children with SB demonstrated a greater risk of having primary headache and those whose parents were separated had a greater chance of having headache. Only sleep bruxism was associated with headache, clenching the teeth during waking hours was not correlated with primary headache.
Key words: Sleep bruxism, Children, Headache

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INTRODUCTION

Bruxism is defined as a repeated activity of the masticatory muscles, characterized by clenching or grinding the teeth. It has two distinct circadian manifestations: sleep bruxism (SB) and daytime bruxism[1)].

According to the definitions of the International Classification of Sleep Disorders (ICSD-3), using criteria proposed by the American Academy of Sleep Medicine (AASM), SB belongs to the group of movement disorders present in parasomnias[2)].

The etiology of bruxism is complex and multifactorial, involving systemic, psychological, occupational, and genetic factors. However, the primary pathogenesis is related to the central nervous system (CNS) activities[3, 4)]. Evidence suggests that SB occurs in response to excessive microarousals[6–8)], and is also related to the patient's quality of sleep[5)]. Emotional factors, such as anxiety, seem to be associated with SB[8–12)].

SB is often seen in children and adolescents, with a prevalence of between 3.5% and 40.6%, depending on the diagnostic method used[13, 14)]. SB presence in childhood may be viewed as a predictor of adult SB[9)].

Children with sleep bruxism may have additional symptoms during the day, such as headaches, earaches, and pain in the

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masticatory muscles[18]. According to Carra et al.[19] SB in young children can also be associated with fatigue of the masticatory musculature, headaches, and noisy breathing during sleep[15–17].

Headache refers to any pain in the cephalic segment, and is an extremely common manifestation that originates primarily from tension, often caused by prolonged muscle contraction. It is usually bilateral, predominantly temporal, occipital, or frontal, and can cause a dull, constant pain, with a characteristic tightness or pressure, often enveloping the head and giving the sensation of "wearing a helmet"[20]. Literature reports a relationship between presence of bruxism and headaches[21–23]. However, an association between SB, tension and migraine headaches in children does not yield sufficient evidence based on the available data.

This study aimed to evaluate the relationship between SB and headache in school children aged 3–6 years, by assessing clinical indicators and the patient's history.

SUBJECTS AND METHODS

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was submitted for approval by the Research Ethics Committee of the Universidade Nove de Julho, n.361299, according to regulatory standards by law. All children guardians received information about the study, signed the informed consent form for participation in the research.

A convenience sample was comprised of children aged 3–6 years, who attended the Centro de Educação Infantil Noemia Fabrício dos Santos Gatto (Araras-SP–Brazil). Children with a complete set of primary teeth without occlusal changes were included in the study. Children with early primary tooth loss, those who used orthodontic appliances, those with physical or psychological limitations that would prevent the research procedures from being conducted, and children who were taking continuous medication, were excluded from research.

Individuals was divided into two stages. The first one consisted of a specific questionnaire, which was sent to parents through the school, and a chart, to be filled in over three days, detailing the child's sleep characteristics. Three days after the questionnaire had been sent out, parents were sent a reminder, asking them to return it. The second stage consisted of a clinical examination, which was performed by a single trained evaluator, during the child remained seated under artificial light and had their tooth surfaces dried with sterile gauze. During clinical examination, teeth were examined for presence or absence of wear facets, tongue was examined for bite marks, and the jugal mucosa was assessed for bites and linea alba.

SB diagnosis was according American Academy of Sleep Medicine criteria: parents related clenching/grinding of teeth, and if there was incisal and/or occlusal wear of the dental elements. According to SB diagnosis, two groups were evalutated: Children with SB and without SB (Control Group).

The sample size was calculated to ashure a test power grater than 80%, thus with 103 subjects and an effect size of 0.35, the test power is 0.899 while maintaining the significant level at α=0.05.

The data were analysed with BioEstat 5.3 program. The data was organized in contingency tables (yes/no answers to each of the aspects analysed) and subjected to the χ^2. Complementary, the odds ration (OR) and confidencial intervals (CI) were calculated to determine the approximated relative risk associated to the risk factor.

RESULTS

One hundred and three children aged 3–6 years participated in this study. The sample was composed of 52 boys (50.5%) and 51 girls (49.5%). Forty-nine of these children (47.6%) were diagnosed with SB, 25 (51%) of them girls and 24 (49%) of them boys, with no gender differences.

About family environment, 18.4% of SB children came from homes where parents had separated, while this number fell to 11.2% among children without SB.

According to parental/guardian reports, 96.3% of children without SB slept well during night, while for the children with sleep bruxism, this number was slightly lower, with 89.8% sleeping well. The other sleep habits are shown in Table 1. We also observed that SB children slept an average of 10 hours a night, while without SB slept an average of 9.5 hours per night.

An average of 20% of children both with and without SB had a habit of biting their nails or chewing on objects, with

Table 1. Sleep habits in both groups

	With bruxism (%)	Without bruxism (%)
Sleep in the same room as their parents	65.3	46.3
Sleep with the door open	89.9	87
Light on in the room	49	61
Quiet room	91.8	85.1
TV in the room	34.6	38.8

no difference between the groups, although daytime clenching had a statistically significant difference (p=0.0012) whereby 40.8% of SB children clenched their teeth during the day, while only 11.1% of the children without SB had this habit.

Another difference we found was related to presence of noises during sleep (p<0.0001), whereby 64.5% of the children with SB and only 0.6% of the children without SB made noises while sleeping. There were no significant differences between sleeping and mouth open or drooling during the night.

In relation to presence of headaches, we observed a statistically significant difference (p=0.0086), whereby 59.2% of SB children had headaches, while among children without SB, this number fell to 31.4%. Headaches also occurred more frequently in the children with SB than in the children without SB (p=0.0369). In 100% of the cases of headaches in the children without SB, pain ceased with sleep, while for SB children, this figure was 89.6%. When evaluating the odds ratio, we observed children with SB were almost three times more likely to have headaches than children without SB (OR=3.07; confidence interval 1.36–6.9). The odds of headache was 3.15-fold (95% CI: [1.41, 7.05]) higher among individuals with sleep bruxism than those without SB. However, no correlation was found between clenching teeth during waking hours and headache (p=0.8213, Fisher test). Children whose parents were separated had an additional risk factor, which, when added to the presence of SB, increased the odds of exhibiting headache by threefold (95% CI=[1.25, 7.17]) in comparison to those without SB (p=0.0179, Fisher test). The same was not found to be true for patients whose parents were together (p=0.2877, Fisher test).

DISCUSSION

Headaches are a very common symptom, such as migraines and tension headaches[24], last one is the most common[25]. It is the result of poor posture or stress. Stress has been associated with SB in literature[28]. Tension headaches and SB involve muscle contractions caused by constantly stress. In present study, an association between SB and headaches was observed, with a three times higher risk developing headaches in children with SB than in children without SB. This data corroborated with Motta et al., who observed that SB children have changes in posture, with the head in a more forward position[26]. Therfore, there is a greater and more intense contraction on masticatory muscles[27] favoring the occurrence of headaches.

Regarding children's sleep quality observed in present study, most of parents reported that their children slept well. However, in most of headaches reported, the pain ceased with sleep, which means a poor sleep quality, with a lack of restful sleep, corroborating with Herrerra et al.[28] who observed that SB children have a higher number of nocturnal microarousals, which seems to be associated with an increase in behavior and attention issues.

A higher incidence of linea alba and biting inside the cheeks in SB children than in children without SB was observed. Despites present data is composed by a convenient sample, this is an important finding to be considered, because in literature, there is no consensus with association with each other yet[29]. Other signs observed in present study, such as presence of noises during sleep and family environment were related with SB presence. Antunes et al. observed that childhood bruxism is related to clinical signs and behaviors too, even bruxism does not significantly affect life quality in this age yet[29].

Althogh present study had had some limitations, such as an absence of control group, results presents positive statistical associations with clinical signs, which is important to evaluate at clinical practice. SB diagnosis is still controvesal in literature, both in children and adults[30–32]. Researches pointed to polysomnography as the gold standard for the SB diagnosis[32]. On the other hand, this is not feasible for the children diagnosis, and the parents' report is still the most acceptable[31]. Therefore, these results point to relevant clinical signs that may aid in a more accurate diagnosis of SB. This study concluded that there is an association between SB and headache in children, and both are related to poor quality of sleep. Thus, we suggest further studies to evaluate the associations between sleep bruxism and headache in children, as well as their therapeutic possibilities.

Conflict of interest

Carolina C. Bortoleto declares that he has no conflict of interest. Monica C. C. Salgueiro declares that he has no conflict of interest. Renata Valio declares that he has no conflict of interest. Yara D. Fragoso declares that he has no conflict of interest. Pamella B. Motta declares that he has no conflict of interest. Lara J. Motta declares that he has no conflict of interest. Fernanda Y. Kobayashi declares that he has no conflict of interest. Kristianne P.S. Fernandes declares that he has no conflict of interest. Raquel A. Mesquita-Ferrari declares that he has no conflict of interest. Alessandro M. Deana declares that he has no conflict of interest. Sandra K. Bussadori declares that he has no conflict of interest.

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Clinical trial registration

The protocol for this study was registered with Clinical Trials number NCT02757261 on 8 April 2016

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REFERENCES

1) Lobbezoo F, Ahlberg J, Glaros AG, et al.: Bruxism defined and graded: an international consensus. J Oral Rehabil, 2013, 40: 2–4. [Medline] [CrossRef]
2) Serra-Negra JM, Paiva SM, Auad SM, et al.: Signs, symptoms, parafunctions and associated factors of parent-reported sleep bruxism in children: a case-control study. Braz Dent J, 2012, 23: 746–752. [Medline] [CrossRef]
3) Kato T, Thie NM, Huynh N, et al.: Topical review: sleep bruxism and the role of peripheral sensory influences. J Orofac Pain, 2003, 17: 191–213. [Medline]
4) Gómez FM, Ortega JE, Horrillo I, et al.: Relationship between non-functional masticatory activity and central dopamine in stressed rats. J Oral Rehabil, 2010, 37: 827–833. [Medline] [CrossRef]
5) Kato T, Rompré P, Montplaisir JY, et al.: Sleep bruxism: an oromotor activity secondary to micro-arousal. J Dent Res, 2001, 80: 1940–1944. [Medline] [CrossRef]
6) Lobbezoo F, Naeije M: Bruxism is mainly regulated centrally, not peripherally. J Oral Rehabil, 2001, 28: 1085–1091. [Medline] [CrossRef]
7) Castelo PM, Barbosa TS, Gavião MB: Quality of life evaluation of children with sleep bruxism. BMC Oral Health, 2010, 10: 16. [Medline] [CrossRef]
8) Gomes EL, Soares KK, Santis TO, et al.: Associação do bruxismo, rinite e sinusite com as infecções respiratórias recorrentes em crianças. Conscientiae saúde, 2010, 9: 285–289.
9) Eftekharian A, Raad N, Gholami-Ghasri N: Bruxism and adenotonsillectomy. Int J Pediatr Otorhinolaryngol, 2008, 72: 509–511. [Medline] [CrossRef]
10) Abanto J, Ortega AO, Raggio DP, et al.: Impact of oral diseases and disorders on oral-health-related quality of life of children with cerebral palsy. Spec Care Dentist, 2014, 34: 56–63. [Medline] [CrossRef]
11) Alves AC, Alchieri JC, Barbosa GA: Bruxism. Masticatory implications and anxiety. Acta Odontol Latinoam, 2013, 26: 15–22. [Medline]
12) Dao TT, Lavigne GJ: Oral splints: the crutches for temporomandibular disorders and bruxism? Crit Rev Oral Biol Med, 1998, 9: 345–361. [Medline] [CrossRef]
13) Manfredini D, Restrepo C, Diaz-Serrano K, et al.: Prevalence of sleep bruxism in children: a systematic review of the literature. J Oral Rehabil, 2013, 40: 631–642. [Medline] [CrossRef]
14) Machado E, Dal-Fabbro C, Cunali PA, et al.: Prevalence of sleep bruxism in children: a systematic review. Dental Press J Orthod, 2014, 19: 54–61. [Medline] [CrossRef]
15) Pizzol KE, Carvalho JC, Konish F, et al.: Bruxismo na infância: fatores etiológicos e possíveis tratamentos. Rev Odontol UNESP, 2006, 35: 157–163.
16) Manfredini D, Lobbezoo F: Role of psychosocial factors in the etiology of bruxism. J Orofac Pain, 2009, 23: 153–166. [Medline]
17) Michelotti A, Cioffi I, Festa P, et al.: Oral parafunctions as risk factors for diagnostic TMD subgroups. J Oral Rehabil, 2010, 37: 157–162. [Medline] [CrossRef]
18) Pizolato RA, Gavião MB, Berretin-Felix G, et al.: Maximal bite force in young adults with temporomandibular disorders and bruxism. Braz Oral Res, 2007, 21: 278–283. [Medline] [CrossRef]
19) Carra MC, Huynh N, Morton P, et al.: Prevalence and risk factors of sleep bruxism and wake-time tooth clenching in a 7- to 17-yr-old population. Eur J Oral Sci, 2011, 119: 386–394. [Medline] [CrossRef]
20) Franco AL, Godoi DA, Castanharo SM, et al.: Interação entre cefaléias e disfunção têmporomandibular; uma revisão da literatura. Rev Odontol UNESP, 2008, 37: 401–406.
21) Evans RW, Bassiur JP, Schwartz AH: Bruxism, temporomandibular dysfunction, tension-type headache, and migraine. Headache, 2011, 51: 1169–1172. [Medline] [CrossRef]
22) Stark CD, Stark RJ: Sleep and chronic daily headache. Curr Pain Headache Rep, 2015, 19: 468. [Medline] [CrossRef]
23) Guidetti V, Dosi C, Bruni O: The relationship between sleep and headache in children: implications for treatment. Cephalalgia, 2014, 34: 767–776. [Medline] [CrossRef]
24) Yagihara F, Lucchesi LM, Smith AK, et al.: Primary headaches and their relationship with sleep. Sleep Sci, 2012, 5: 28–32.
25) Molina OF, Peixoto MG, Eid NL, et al.: Headache and bruxing behavior types in craniomandibular fisorders (Cmds) patients. Rev Neurocienc, 2011, 19: 449–457.
26) Motta LJ, Martins MD, Fernandes KP, et al.: Craniocervical posture and bruxism in children. Physiother Res Int, 2011, 16: 57–61. [Medline] [CrossRef]
27) Bortoletto CC, Cordeiro da Silva F, Silva PF, et al.: Evaluation of cranio-cervical posture in children with bruxism before and after bite plate therapy: a pilot project. J Phys Ther Sci, 2014, 26: 1125–1128. [Medline] [CrossRef]
28) Karakoulaki S, Tortopidis D, Andreadis D, et al.: Relationship between sleep bruxism and stress determined by saliva biomarkers. Int J Prosthodont, 2015, 28: 467–474. [Medline] [CrossRef]
29) Antunes LA, Castilho T, Marinho M, et al.: Childhood bruxism: related factors and impact on oral health-related quality of life. 2016, 36: 7–12.
30) Fulgencio LB, Corrêa-Faria P, Lage CF, et al.: Diagnosis of sleep bruxism can assist in the detection of cases of verbal school bullying and measure the life satisfaction of adolescents. 2016.
31) Restrepo C, Manfredini D, Castrillon E, et al.: Diagnostic accuracy of the use of parental-reported sleep bruxism in a polysomnographic study in children. Int J Paediatr Dent, 2017, 27: 318–325. [Medline] [CrossRef]
32) Torabi-Nami M, Mehrabi S, Derman S: Repetitive arm movements during sleep: a polysomnographic sssessment. 2016, 7: 269–275.