Sleep bruxism in children

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Abstract

Bruxism is considered a parafunction because it does not have a functional objective, such as mastication, phonation, or swallowing. This condition is very common in children. The consequences of bruxism in children are: fracture of teeth, increased tooth sensitivity, slight or severe erosion of dental enamel, hypermobility of the teeth, periodontal ligament injury or periodontal, fractured cusps, pulps, pulp necrosis, and inflammation of recessions gums, alveolar bone resorption and non-carious cervical lesions. The physiological pathology of bruxism in children is still unknown. The aim of this study is to assess the current state of the literature concerning the topic particularly focusing on the epidemiology, etiology, associated disorders and treatment.

Introduction

The term “bruxism” was first introduced by Marie Pietkiewicz in 1907. Sleep bruxism is defined as grinding of teeth characterized by rhythmic patterns of masseter activity and audible sounds that are usually non reproducible during the conscious state.

Bruxism is classified as a parafunction, because it does not have a functional objective, such as mastication, phonation, or swallowing.

This disorder is characterized by episodes resulting from the activity patterns of the masticatory muscles (RAMMA) with or without teeth grinding during sleep; typically occurs during the stages of non-rapid eye movement sleep N1 and N2, and is associated with arousals from sleep. Sleep bruxism is usually identified by a family member who observes the sound tooth grinding stereotypies, or by a dentist who recognizes abnormal occlusal usury. The symptoms associated with sleep bruxism include headaches, neck pain, back, shoulders, or chest, pain and stiffness in the morning, and the tenderness of the temporomandibular joints.

This condition is common in children, the consequences of bruxism in children are: fracture of teeth, increased tooth sensitivity, mild or severe erosion of tooth enamel, hypermobility of the teeth, gum or periodontal ligament injury, fractured cusps, pulps, pulp necrosis, and inflammation of the gums, alveolar bone resorption recessions and non-carious cervical lesions.

Epidemiology

The onset of bruxism in children can occur after the first year of life, with the eruption of the deciduous incisors.

The reported prevalence of sleep-bruxism is highest during childhood, decreases across the life span and can resolve spontaneously.

The prevalence of childhood sleep-bruxism varies from 14% to 17%, 5–20%, 22%, 28–30%, and 38%; however, prevalence rates may be underestimates since less common occurrences may not come to medical attention. The prevalence of bruxism in adults, conversely, is estimated around 8%.

White children were reported to brux more than African and American children.

Renner et al. conducted a sound and informative investigation onto the relationship between bruxism and mental health in children. They demonstrated that bruxism is associated with emotional difficulties and socio-economic status. However, these relationships are complex and require further study.

Bruxism rates were significantly higher in babies born weighing less than 1500g.

Children exhibited significantly more bruxism when they were part of a family in which the head was an unskilled manual worker, unemployed, or in which the mother was smoking or unmarried but cohabiting.

Sleep bruxism may serve as a behavioral indicator, or a sentinel marker, for possible adverse health conditions among children and may be a signal of early health care intervention need. For example, a recent report indicated that children who brux are 2.4 more likely to migraines experience than children who do not brux.

Significant associations were found between mental health symptoms: children with any form of bruxism scored significantly higher on all SDQ subscales, which consist of emotional symptoms, conduct problems, peer problems, and hyperactivity. Depression was not significantly associated with any form of bruxism.
Bruxism-associated sleep problems during childhood might lead to subsequent deleterious psychiatric problems. An eleven year longitudinal study among four years old children, indicated that sleep problems at the age of four predicted behavioral and emotional problems at the age of fifteen (19). Large sample studies that examine child behavior problems in association with sleep bruxism may help build a framework for clinicians to avert potentially adverse developmental trajectories among child bruxers.

It is interesting to point out that the feeling of anxiety due to separation from their parents during the night, and their presence at the time of going to sleep, both behaviors are more prevalent in children with bruxism (20). Increased sleep-bruxism was associated with increased health problems and increased health problems was associated with decreased neurocognitive performance (21). Bruxism can also be a symptom present in individuals with Down syndrome: about 42% in children between 3 and 14 years (22). There are cases where there was no difference between the children with Down syndrome and those unaffected (23). Children with cerebral palsy may have instead a higher prevalence of bruxism from 36.9% to 69.4% (24).

Etiology

The etiology of bruxism is considered to be multifactorial, including local (25), psychological (21), and neurological factors (26). The physiological pathology of bruxism in children is still unknown. In a recent study, it was found no significant relationship between occlusal factors and the presence of bruxism (27). A prevailing theory indicates anxiety and stress as primary contributing factors to bruxism behavior in children. In individuals between 5 and 18 years, 66% of the bruxism episodes are associated with electroencephalographic activations; these occur in the second stage of the non-rapid eye movement sleep (28). A series of events preceding the onset of an episode of bruxism have been defined in adults and in children, but still require confirmations:

- Increased sympathetic 1 minute before
- Increase the frequency electroencephalographic 4 seconds before
- Increase respiratory amplitude associated with tachycardia 1 second before
- Increase of EMG suprathyroid muscle 0.8 seconds before (29)
- RMMA With or without teeth grinding

Neurotransmitters stimulating the central nervous system appear to have some role in the development of bruxism fact in children with Attention Deficit Hyperactivity Disorder and taking stimulant drugs on the central nervous system had a higher prevalence of bruxism compared to control children (30). In children with bruxism, a previous study also observed increased levels of urinary adrenaline and dopamine (31). Sleep Bruxism were more likely to present low concentrations of awakening salivary cortisol (32).

Although hereditary factors may play an important role in the development of bruxism. A study of twins showed that in identical twins there was a greater chance of the presence of grinding teeth compared to individuals heterozygous; a child with bruxer parent has a chance of bruxism 1.8 increased to submit this dysfunction (33).

Bruxism in children: sleep disorders and airway patency

Many studies demonstrated that SB, snoring and obstructive sleep apnea are closely related in children, but the mechanism behind this relationship remains unknown. These sleep disorders are often associated with mouth breathing and adenoid/tonsil hypertrophy/infection (34). When OSA is also present, an increase in exhaled CO2 may occur, which can be detected in a sleep study (polysomnography) (35). SB was strongly associated with sleep talking. There were at least two possible explanations: as both conditions involved facial muscles which were under the control of corticobulbar tract, disinhibited corticobulbar overactivity during sleep was postulated to be responsible for the strong association of SB and sleep talking (36). In addition, both conditions might be more prevalent in children with sleep related breathing disorder as they were found to occur immediately after an apneic event (37). Sleep fragmentation could lead to behavior and attention problems (38). Alternatively, children with behavior and attention difficulties might exhibit more disruption of sleep pattern with predisposition to bruxism (39).

A significant increase in the amplitude of respiration takes place just before the episodes of bruxism,
suggesting that bruxism can help restore airway patency in some patients [38].

In a previous study, 16 pediatric subjects with bruxism on 17 also had the symptom of snoring as observed parents [49]. Children with nasal obstruction had a 65.2% prevalence of bruxism; the prevalence also decreased significantly after a tonsillectomy (from 45.5 to 11%) [41, 42].

Bruxism may be caused by allergic processes, by asthma and by respiratory airway infection. Thus, bruxism may be a reflex of the central nervous system due to an increase in negative pressure in the middle and/or inner ear, caused by allergic edema of the mucosa of the auditory tubes. The disorder of the middle ear would induce a reflex action in the temporomandibular joint (TMJ), stimulating the nucleus of the trigeminus nerve [40].

Bruxism in children and temporomandibular disorders

The prevalence of temporomandibular disorders (TMD) in children and adolescent varies widely in the literature from 16%, in children with primary dentition, to 90%, in children with mixed dentition [44, 45].

The relationship between TMD and bruxism in childhood and adolescence is controversial. Bruxism was not related to signs and symptoms of TMD in young children [46], but it was suggested that the prevention of parafunctions in early childhood could help to decrease TMD problems related to parafunctional habits [47].

Alamoudi [48] verified significant relationship between attrition, symptoms of TMD and deviation on opening in preschool children. Widmalm et al. [49] reported a significant association between bruxism and most of the TMD signs and symptoms in same age children, but clinical examination and interview were carried out without the parents. It has been demonstrated that comparing the informations obtained by the children and the questionnaires answered by the parents the validity of the study can be more reliable [50].

Vanderas [51], using other methodology, found also statistically significant correlation between TMD and oral parafunction, such as grinding, clenching and lip/cheek biting in children classified as calm, who did not experience unpleasant life events.

According to Widmalm et al. [52] of the ten variables pain experienced by preschool children, eight were significantly associated with bruxism, three with thumb sucking and two with nail biting. However, the association does not explain if a parafunction is the cause or the consequence of pain or if a third factor is causing both pain and increased prevalence of oral parafunctions.

As bruxism may occur during sleep it should be considered a careful interpretation about the findings of many studies, which might overestimate the relationship between bruxism and TMD in children. The unreliability of the clinical assessment of bruxism (such as tooth wear, which can be a chronic problem) reduces the possibility of drawing conclusions about its relationship with TMD.

Bruxism treatment in children

The treatment of bruxism in children may consist of a number of approaches:

- A good clinical history should be recorded in children with bruxism to detect the presence of coexisting diseases such as migraine, sleep apnea syndrome, temporomandibular disorders, respiratory problems, need for tonsillectomy, daytime sleepiness and in these cases send the child to specialist competence (to a doctor specializing in sleep disorders and to the otolaryngologist).
- Validate the presence of musculoskeletal dysfunction of the cervical spinal. A recent study [53] observed the disappearance of bruxism in children as a result of the manipulations in the over-cervical area; but this remains to be confirmed.
- Behavior change: parents should be taught the techniques of relaxation and sleep hygiene.
- Psychological assessment in terms of anxiety and hyperactivity and in all those psychological conditions that may facilitate the emergence.
- Treatment with occlusal splint (OS) that should not alter growth and the development of the subject and require collaboration. In a recent clinical study is showed a reduction in grinding sounds in children following the use of an occlusal splint [54].

While the sleep bruxism activity has no known cure it may be reduced with the use of an OS. The aim of this device is to protect the dental structure through the avoidance of habits and consequent loss of the vertical dimension of the teeth. A systematic review has confirmed that an OS offers benefits with regard to tooth wear [55]. A previous study evaluated the effect of an OS to control signs of bruxism in children of 3 -5 years. The diagnosis was based on the presence of dental habits and the sample was made up of nine children. A visual inspection of stone models was carried out for the examination of wear facets. The patients were divided in two groups (control and test group) and followed up for 2 months. At the end of study, cast models made before and after eight
months were compared and considerable wear was found in the control group. 

Conclusions

Sleep bruxism is a very common phenomenon in children whose etiology is still unknown. It requires more attention and further study. There are strong associations between bruxism and the presence of emotional difficulties, adenoid-tonsil hypertrophy-infection, snoring, nasal obstruction, sleep talking, attention deficit, hyperactivity disorder and TMD. It is also associated with an increase in health problems and reduced neurocognitive performance.

From a clinical point of view, it is very important to catch this problem in children and assess the coexistence of other diseases and depending on the severity use occlusal splint to reduce damage to the stomatognathic apparatus.

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