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Cognitive behavioural therapy in the management of sleep bruxism in children- A review

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Abstract

Sleep bruxism (SB) is an oral parafunction with high incidence in young children that can perpetuate into adulthood. It is of multifactorial etiology that includes pathophysiological and psychological factors. The most prevalent signs and symptoms are dental wear and headaches, related to anxiety, stress and behaviour problems, due mainly to the presence of habits and emotional changes during childhood, which alter sleep and develop bruxism. Sleep bruxism can be assessed using non-instrumental approaches, with self-report and clinical inspection, or instrumental approaches, with electromyographic (EMG) recordings of masticatory muscle activity and polysomnography (PSG). Polysomnography is the most effective method of diagnostic testing for SB in children. The treatment is not yet well established; however, the combination of orthodontic interventions, physiotherapy, psychological therapy and pharmacology can manage SB in children.

Keywords: Sleep Bruxism, Electromyographic, Polysomnography.

Introduction

Bruxism is the repetitive masticatory muscle activity characterised by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible(1).

Bruxism can be distinguished into two types: sleep bruxism and awake bruxism(2).Awake bruxism is characterised by clenching one's teeth during waking hours and sleep bruxism is the unconscious activity of grinding or clenching one's teeth during sleep with the production of audible sounds(3).

Sleep bruxism is defined as 'a masticatory muscle activity during sleep that is characterised as rhythmic (phasic) or non-rhythmic (tonic) and is not a movement disorder or a sleep disorder in otherwise healthy individuals'(4).

Sleep bruxism is an important clinical condition seen more commonly in children than adults. The prevalence

in children varied from 3.5%to 40.6%anddecreases with age. No gender difference has been reported in SB(5).

High levels of anxiety and stress can precipitate the occurrence of bruxism. Orofacial pain, headaches, sleep disorders, sleep breathing disorders such as apnoea and hypopnoea ; behaviour disorders, or those associated with the use of medications are also influenced by bruxism(6).

Sleep bruxism (SB) may also lead to masticatory muscle hypertrophy, temporomandibular disorders, malocclusion, tooth surface loss, fracture of restorations or teeth, hypersensitive or painful teeth(7).

Although craniofacial structure and dental irregularities can produce SB, etiological theories consistently highlight the role of psychological factors and anxiety in particular(8).

Etiology of sleep bruxism

The etiology of bruxism is complex and multifactorial in children(8).The neurophysiology of SB is inclining more toward central nervous system rather than peripheral factors, such as dental occlusion(9).

Stress and anxiety

The symptoms of anxiety in children which is difficult to identify, tend to change with developmental stages. Higher prevalence of SB is mainly associated with emotional and behavioural problems in schoolchildren, based on parental reports(10). Moreover, children with separated parents show a greater prevalence of SB (11).

Somatic anxiety is mainly associated with increased muscle tone. Based on polysomnography (PSG) studies, children with SB shows increased incidence of tension headache. Generalized anxiety disorder (GAD) and social anxiety disorder are commonly associated with bruxism(12).Additionally, there is a strong correlation between SB and neuroticism.

Stress sensitivity, evaluated by salivary cortisol is a psychological factor associated with bruxism. Children with SB had higher levels of salivary cortisol, which helps regulate the body's response to stress, during their school day than in children without SB(13).

Sleep

Children with SB have more difficulty maintaining their biological rhythm. During sleep, 66% of SB activity is associated with electroencephalographic arousals in children of school age and teenagers. Moreover, SB activity occurs more often in light sleep stages than in rapid eye movement sleep(14).SB is more commonly seen in children with snoring and nightmares(15).

Risk Factors

Children with SB are more likely to be bedwetters, aggressive, nail biters, complain of headaches, wake up at night from pain, drool, snore, sleepwalking, talking while sleeping, wake up crying from muscle cramps during the night, and have colic(16).

Gastroesophageal reflux also appears to be a risk factor for SB and it execute a protective function by stimulating salivary flow (7).

Certain drugs and chemicals can increase the number of SB episodes. The most commonly mentioned compounds are selective serotonin reuptake inhibitors (e.g., paroxetine, fluoxetine, sertraline), selective norepinephrine reuptake inhibitors (e.g., venlafaxine), antipsychotics (e.g., haloperidol), flunarizine, amphetamines (e.g., methylphenidate), 3,4-methylphenidate (ecstasy), nicotine, and alcohol(17).

SB is also associated with the socioeconomic and cultural characteristics of children. Children from high socioeconomic status is commonly seen with SB compared to children from a poor background, which may be due to the higher number of daily duties and demands by children(18).

The consumption of added sugar and excessive screen-time is increasing worldwide, increasing the prevalence of sleep problems, psychosocial disorders, lack of cortisol homeostasis, depression and hostility, and attention deficit hyperactivity disorder-related symptom. All these issues have also been associated with SB in children(19).

Diagnosis of Bruxism in Children

Diagnosis and clinical evaluation of bruxism is generally a complex process for SB. The following tests are routinely performed : patient report and clinical interview, clinical examination, assessment with intraoral devices (mandibular advancement devices), recording of muscle activity, electromyography (EMG), and Polysomnography(PSG)(7).

On clinical evaluation, tooth wear is associated with an increased risk of SB in children. However, the observation of wear on the hard surfaces of tooth tissues does not confirm the clinical diagnosis of SB(15).Hypertrophy of the masseter muscles, discomfort, fatigue and headache are common findings in SB(20).

Intraoral devices

Intra-oral appliances can detect SB, the incorporation of electric devices helps to detect the forces acting during clenching/grinding. The wear facets on intra-oral splints have been observed in the literature but not validated in detection of bruxism(21).

Electromyography (EMG)

EMG records the electrical activity of masseter or temporal is muscles generated during movement, and will provide information on extent, duration and force of muscle activity(22).The drawback is it cannot detect grinding noises, nor it can distinguish between bruxism and other orofacial activities like swallowing, talking, lip biting/sucking(23).

Polysomnography

Polysomnography (PSG) incorporates various recordings including EMG, electroencephalogram, electrocardiogram (ECG) and audio-visual recordings. These detailed evaluations allow arousal from sleep to be assessed, and the presence of other sleep disorders to be ruled out(24).The SB episode scan be distinguished more readily from other orofacial movements. PSG with audiovisual recording is the ‘gold standard’ mode of assessment and diagnosis of sleep movement disorders and SB(25).

Grading

Grading system proposed by Lobbezoo et al(1) in 2013 is transformed as follows:

1. Possible sleep/awake bruxism is based on a positive self-report only.
2. Probable sleep/awake bruxism is based on a positive clinical inspection, with or without a positive self-report.
3. Definite sleep/awake bruxism is based on a positive instrumental assessment, with or without a positive self-report and/or a positive clinical inspection.

Management

In children, treatment for SB is not well established. Thus, SB management includes managing orofacial and dental consequences and assessing for any other comorbidity(26).Management is usually directed toward tooth/restoration protection, reduction of bruxism activityand pain relief. Pharmacological, psychological, and dental strategies had been employed to manage SB(27).

Pharmacological therapy

Pharmacological therapy has been used to reduce stress and anxiety and improve the quality and quantity of sleep, while surgical treatment is used to remove airway obstruction(15).Drugs used for treating bruxism include

benzodiazepines, anticonvulsants, beta-blockers, serotonergic and dopaminergic drugs, antidepressants, muscle relaxants and botulinum toxin(7)(28).

Physiotherapy is currently used for the treatment of SB. The commonly used methods are kinesio therapy, massage, infrared therapy, and low-level laser therapy (LLLT). Among them, LLLT is non-invasive, cost-effective, painless, and requires a shorter exposure time per acupoint(29).

Sleep hygiene measures and relaxation techniques

Behavioural strategies include biofeedback, relaxation, and improved sleep hygiene. Biofeedback aims to provide immediate information to the patient about their behaviour, enabling its reduction. SB treatment for children generally starts with patient education related to sleep hygiene. This includes providing good conditions in the bedroom and restricting eating, drinking, and physical activity before going to bed. Psychological therapy, are applied to change undesirable habits and reduce stress to lead to a healthier lifestyle(30).Sleep hygiene and physiotherapy have been effective in children with sleep bruxism(31).

Splint therapy

Dental treatment of bruxism involves the use of occlusal appliances during sleep in order to protect the teeth against pathological abrasion. Occlusal splints have been considered as the first-line strategy for prevent sleep bruxism(32).Rapid palatal expansion (RPE) is an effective orthodontic treatment for correcting maxillary transverse deficiency and sleep-disordered breathing and reduce the incidence of SB in children(33).Both the Mandibular advancement device and maxillary occlusal splint significantly improved sleep quality and reduced SB episodes(34).

Contingent electrical stimulation

Contingent electrical stimulation (CES) has reappeared in an attempt to reduce the masticatory muscle activity associated to sleep bruxism. The rationale for CES consists in the inhibition of the masticatory muscles responsible of bruxism, applying a low-level electrical stimulation on the muscles when they become active, i.e. during the bruxism episode(35).

Conclusion

Although bruxism in children is common, the literature on its diagnosis and treatment is not yet extensive enough for evidence-based clinical practice guidelines. Until the etiology of bruxism is definitively determined, treatment options will remain based on anecdotal evidence. Clearly, well-designed studies on the management of bruxism in children are needed.

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