

DIAGNOSIS AND MANAGEMENT OF SLEEP BRUXISM

*Aswathy A Kumar, *Aiswarya R Nair, *Fayiz S Faizal, **Sudeep S, ***Manoj Prasad PG

*Post Graduate student, **Professor and Head of the Department, ***Senior Lecturer, Department of Prosthodontics, PMS College of Dental Science and Research, Vattapara, Trivandrum | Corresponding Author: Dr. Aswathy A Kumar, E-mail: aswathi418@gmail.com

Abstract

Sleep bruxism is a common phenomenon caused due to masticatory muscle activity during sleep. Proper methods for screening and diagnosing patients with Sleep Bruxism are crucial for the success of dental treatment. Literature reviews and clinical experiences indicate a lack of patient awareness and under reporting of sleep bruxism. Clinicians should look for clinical signs and symptoms of Sleep bruxism in the patient and deliver minimally invasive treatment modalities.

Keywords: Sleep bruxism; Bruxism; Biofeedback;
Diagnosis: Management

INTRODUCTION

Bruxism is defined as 'A repetitive jaw muscle activity characterized by clenching or grinding of the teeth and /or by bracing or thrusting of the mandible' (ICSD)¹. The word Bruxism originates from the Greek word "Brychien" which means "to gnash the teeth". In 1931, Frohman described the concept of "bruxomania" as a psychic state and further stated that "Bruxism" isn't necessarily audible².

Sleep Bruxism is considered to be primarily a sleep-related movement disorder which may be associated with multifactorial etiology involving complex multisystem physiological processes. It occurs in 8-13% of the general population^{1,3}. Dentists ought to bear in mind of the potential etiology and its management strategies for providing better treatment for the patients.

MATERIALS AND METHODS

An electronic search was made in the database of Pubmed and Google scholar completed in October 2020. The following key words were used sleep bruxism, bruxism, sleep disorders, treatment and sleep bruxism, etiology and sleep bruxism, diagnosis and sleep bruxism, nocturnal bruxism. English-language papers dealing with the prevalence assessment of sleep bruxism at the general population level by using questionnaires, recording case history, clinical assessments, and polysomnographic (PSG) or electromyographic (EMG) recordings were included^{4,5-9}. A hand searching for all the relevant references of included studies were also conducted. The collected articles were reviewed thoroughly for obtaining the relevant information.¹⁰⁻¹⁸

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Review of Literature

Diagnosis and management of sleep bruxism can present a challenge for the clinician.

According to Kanathila et al¹⁹ the signs and symptoms of sleep BRUXISM are

1. Pain in the teeth and sensitivity to heat and cold.
2. Chronic muscular facial pain with tension headaches, caused by intense muscle contraction.
3. The noise noticed by parents, friends or relatives, that occurs as the teeth are ground together.
4. An abnormal alignment of the teeth, caused by uneven tooth wear .
5. Flattened and worn tooth surfaces, which may reveal the underlying yellow dentine layer.
6. Microfractures of the tooth enamel.
7. Broken or chipped teeth .
8. Loose teeth with possible damage to the tooth sockets
9. Stiffness and pain in the jaw joint (temporomandibular joint or 'TMJ') that cause restricted opening and difficult chewing; sometimes the jaw joint may suffer damage that is slow to heal.
10. Earache.

Diagnosis

Chairside recognition of SLEEP BRUXISM (SB) includes the use of subjective reports, clinical examinations, and trial oral splints. Definitive diagnosis of SB can only be achieved using electrophysiological tools¹.

(a) Patient report and clinical evaluation

Diagnostic criteria for SB by the International

Classification of Sleep Disorders²⁰ was as follows: The presence of (a) regular or frequent tooth grinding sounds during sleep and (b) one or more of mentioned clinical signs (i) abnormal tooth wear, (ii) transient morning jaw muscle pain or fatigue, and/or temporal headache, and/ or jaw locking on awakening according to reports of tooth grinding during sleep.

SB research diagnostic criteria (SB-RDC) Lavigne, et al²¹:- Report of grinding noises by bed partner for a minimum of 5 nights each week for the past 3-6 months One of: tooth wear into dentine with some loss of crown height; masseteric hypertrophy; positive PSG (at least 2 episodes of grinding noise per night, over 4 SB episodes and over 25 bruxism bursts per hour of sleep)

(b) Intraoral appliances

Some intra-oral appliances aim to detect SB, like via the incorporation of electrical devices detecting forces applied during clenching/ grinding²². Takeuchi et al. suggests a recording device for sleep bruxism, Intra-splint force detector (ISFD). It uses an intraoral appliance to measure the force being produced by tooth contact on the appliance. The ISFD detects the force by employing a thin, deformation-sensitive piezoelectric film, which is embedded 1–2 mm below the occlusal surface of the appliance. But ISFD wasn't suitable for detecting the magnitude of force during steady-state clenching behaviour²³

Dental appliance with capsules full of dental waxes are often utilized for diagnosis of bruxism and to convince the patients that they brux indeed grind²⁴.

The Bruxcore Bruxism monitoring device (BBMD) was introduced to analyse the nocturnal bruxism activity. Bruxcore plate is used to gauge the bruxism events by counting the quantity of abraded microdots on its surface and by scoring the volumetric magnitude of abrasion. The BBMD uses 0.51-mm-thick PVC plate that consists of 4

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layers with two alternating colors and a halftone dot screen on the topmost surface. The quantity of missing microdots is counted to gauge the abraded area and thus the amount of layers uncovered represents the depth parameter. Both of those parameters are combined so as to obtain an index for the number of bruxism activity. The main disadvantage of this method is that it's difficult to count the quantity of missing dots with good accuracy. [25]

(c) Masticatory muscle electromyographic recording

A miniature self-contained EMG detector-analyser (bite-strip) was developed as a screening test for moderate to high level bruxers, which measured the bruxism events by simply attaching it to the skin and tissues over the masseter muscle. Recently, a miniature self-contained EMG detector-analyser with a biofeedback function (grindcare, medotech, denmark) was developed as a detector and biofeedback device for sleep bruxism. It works by the online recording of EMG activity of the anterior temporalis muscle, online processing of EMG signals to detect tooth grinding and clenching and also biofeedback stimulation for reducing sleep bruxism activities²⁶.

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 thus the presence of other sleep disorders to be ruled out. PSG with audiovisual recording is the 'gold standard' mode of assessment and diagnosis of sleep movement disorders and SB²⁷.

Management

Management of sleep bruxism aims to seek out and take away the causes of bruxism, change the behaviour that causes bruxism and repair the damage that bruxism often causes.

(a) Occlusal therapy

Occlusal splints are considered as the first-line of management for preventing dental grinding noise and tooth wear in case of sleep bruxism. These splints have different names like occlusal bite guard, bruxism appliance, bite plate, night guard, occlusal device. They're classified into hard splints and soft splints. Hard splints are preferred over soft splints because soft splints are difficult to regulate than hard splints and hard splints are effective in reducing the bruxism activity¹⁹.

Partial coverage anterior splints (for example, the nociceptive trigeminal inhibition, or NTI, splint) are utilized in bruxism to scale back muscle activity via reducing maximum clenching force.

(b) Kinesio taping

KINESIO TAPING (KT) are often used as a routine treatment technique for SB as an alternate to OCCLUSAL SPLINT(OS). The OS can't be employed in patients with nausea, with risk of swallowing or aspiration the splints, or with braces or appliances within the teeth for treatment. For OS therapy, it's necessary to get measurements from the jaw of the patient and to regulate the occlusion, which makes OS therapy more time-consuming than KT for both the patient and the physician.²⁸

(c) Behavioural modification

Psychoanalysis, hypnosis, meditation, sleep, hygiene measures with relaxation techniques and self-monitoring are considered for the treatment of bruxism. The treatment of sleep bruxism usually begins with counselling of the patient with reference to the sleep hygiene. It includes to instruct the bruxer to prevent smoking and drinking of coffee or alcohol at night, to limit the physical or mental activity before getting to bed, and to make sure good bedroom conditions like quiet and dark [29]

(d) Biofeedback

Biofeedback works on the principle that "bruxers

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can unlearn their behaviour when a stimulus makes them conscious of their adverse jaw muscle activities". Mittelman described an EMG technique that gives the daytime bruxer with auditory feedback from his/her muscle activity letting him know the degree of muscle activity or relaxation that's happening¹⁹.

Nissani used a taste stimulus to awaken the patient, in case of sleep bruxism. Before getting to sleep or whenever bruxing is suspected to occur, the patient attaches two liquid-filled sleeved capsules to the removable appliance and inserts the appliance into the mouth. The appliance is so designed that the capsules are positioned between the lower and upper teeth and are evenly balanced on all sides of the mouth. Whenever the user attempts to brux, a minimum of one capsule releases its disagreeable liquid.²⁴

In recent years, contingent electrical stimulation (CES) has appeared in an effort to scale back the masticatory muscle activity associated to sleep bruxism. The rationale for CES includes the inhibition of the masticatory muscles liable for bruxism by applying a low-level electrical stimulation on the muscles once they become active, i.e. during the bruxism episode. Experimental studies have used CES in patients with signs and symptoms of sleep bruxism and myofascial pain, and located a reduction of the EMG episodes per hour of sleep while using CES, but with no changes in pain and muscle tension scores.³⁰

(e) Pharmacological therapy

Certain drugs have paralytic effect on the muscles, by inhibiting acetylcholine release at the neuromuscular junction (NMJ) thereby decreasing bruxism activity in severe cases like coma, brain injury etc. During a study, botox injections over a period of 20 weeks showed decrease in bruxism activity in 18 subjects. This study suggested that botulinum toxin inhibited the discharge of acetylcholine at NMJ¹⁹.

Shim et al. found that the amplitude of the contraction during bruxism events was reduced after 4 weeks of injection of botulinum toxin, but with no changes within the rhythm or number of bruxism episodes per hour of sleep.³¹

In a study by Carra et al in 2010 single dose of clonidine (0.3 mg by mouth) 1 h before bedtime 4-night protocol showed significant reduction in sleep bruxism.^[32]

Deep Dry Needling of active Myofascial trigger points within the masseter and temporalis in patients with myofascial TMD and SB was related to immediate and 1-week improvements in pain, sensitivity, jaw opening and TMD-related disability^[33].

Discussion

The present review evaluated the existing literature related to the diagnosis and various treatment modalities of SB in an adult population.

It seems that each tested pharmacological approaches [i.e. botulinum toxin, gabapentin, clonidine and dry needling] may reduce SB with respect to placebo. Clonidine was significantly more effective in suppressing SB compared with clonazepam³⁴.

A study compared occlusal splints versus a medication doses of gabapentin, and concluded that both treatments reduced similarly the muscle activity related to sleep bruxism after 2 month of therapy³⁵.

Landry et al in 2009 stated that Mandibular Advancement Appliance are more effective than Maxillary Occlusal Splint to reduce SB The short-term use of a robust MAA is associated with SB decrease³⁰.

Matsumoto et al in 2015 found out that the intermittent use of stabilisation splints may reduce SB activity for a longer period compared with that

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of continuous use²⁴.

Adverse effects associated with biofeedback are most likely to centre on the feedback stimulus. Frequent arousal may cause fatigue and, in SB, sleep disruption and consequent daytime sleepiness³⁶. Considering the ineffectiveness of biofeedback mechanism Lobbezoo et al. included 'pep talk' (i.e. counselling strategies) as part of a common sense approach to bruxism management. It seems prudent to recommend their inclusion in any SB treatment protocol to maximise the effects of any multimodal approach, even if not effective as stand-alone therapies³⁷.

Conclusion

Dentists should be aware of the potential aetiology, pathophysiology, methods of diagnosis and management strategies of sleep bruxism in order to provide better quality of life to the patients.

In this era of evidence based treatments the only treatment modality with enough evidence for limiting bruxism is the use of OA³⁷.

A combination of different strategies may be used to protect teeth/ restorations, reduce bruxism activity, and relieve pain. Further randomized control studies are needed to analyse the efficacy and safety of various treatment modalities for sleep bruxism. The indications for SB treatment, association between sleep bruxism and other sleeping disorders also needs further exploration.

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