



SYSTEMIC CONDITION ASSOCIATED WITH BRUXISM -A LITERATURE REVIEW

**Dr Mahesh kumar¹ K, Dr. Vundela Rajashekar Reddy^{2*}, Dr Nagalakshmi Chowdhary³, Dr
Ambika K Nandini⁴, Dr Balamurugan Subaranjana⁵, Dr Aishwaraya Agarwal⁶**

Abstract

Bruxism, a condition that can be primary as in with no pre-medical complications, or secondary due to psychiatric medication or neurological disorder such as Parkinson's and Huntington's diseases. It involves a steady clenching of the teeth, grinding and or combination of both. Bruxism is an universal hurdle amongst clinicians as its abnormal parafunctional activity when ignored leads to masticatory muscle hypertrophy, tooth surface loss, fracture of restorations, hypersensitivity and oro-facial pain. This article gives a brief review on bruxism associated with systemic conditions with literature concerning the etiology of the oral habit, clinical manifestations and current treatment approaches of bruxism like occlusal therapy, behaviour modification, Biofeedback and pharmacological therapy.

Keywords: Bruxism, Behavioural Disorder, Asthma, Night Guard, Biofeedback

¹Post Graduate Student, Department of Pedodontics and Preventive Dentistry, Sri Siddhartha Dental College and Hospital, Sri Siddhartha Academy of Higher Education, Tumakuru, Karnataka-572107

²Reader, Department of Pedodontics and Preventive Dentistry, Sri Siddhartha Dental College and Hospital, Sri Siddhartha Academy of Higher Education, Tumakuru, Karnataka-572107

³Professor & HOD, Department of Pedodontics and Preventive Dentistry, Sri Siddhartha Dental College and Hospital, Sri Siddhartha Academy of Higher Education, Tumakuru, Karnataka-572107

⁴Senior Lecturer, Department of Pedodontics and Preventive Dentistry, Sri Siddhartha Dental College and Hospital, Sri Siddhartha Academy of Higher Education, Tumakuru, Karnataka-572107

⁵Private practitioner, Pearl smile care Madurai-625007

⁶Post graduate student, Department of Pedodontics and Preventive Dentistry, Sri Siddhartha Dental College and Hospital, Sri Siddhartha Academy of Higher Education, Tumakuru, Karnataka-572107

***Corresponding Author: Dr. Vundela Rajashekar Reddy**

*Reader, Department of Pedodontics and Preventive Dentistry, Sri Siddhartha Dental College and Hospital, Sri Siddhartha Academy of Higher Education, Tumakuru-572107

Email id: drvrajashekarreddy@gmail.com Ph no: 9035894944

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INTRODUCTION:

Bruxism is an unintentional oral habit of periodic, non-functional clenching, grinding of teeth often identified with crunching and squeaky sounds.¹ According to Lobbezoo F et al, 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' with 'two distinct circadian manifestations; either occurring during sleep (nocturnal bruxism) or wakefulness (Diurnal bruxism).² Sleep bruxism has been found to be prevalent amongst children than in adults. The Prevalence of Awake bruxism (AB) in adult was reported to range from 22.1% to 31% while that of frequent Sleep bruxism (SB) was more consistent at 13%.³ Children's SB prevalence ranged from 3.5% to 46%, but exact percentage is hard to determine as most population studies are based out of questionnaire and that most bruxers are unaware of their habit which is as low as 15% to 23%.⁴ The exact cause of bruxism is still unknown, however it is believed to include a number of components, including central ones involving brain neurotransmitters or the basal ganglia, psychosocial ones like stress and anxiety, and peripheral ones like problems with dental occlusion. Bruxism has been previously considered as a disorder and or disease but rather it is a parafunctional oral habit.⁵ Treatment of bruxism is recommended to be multidisciplinary, for both children and adults which are aimed to protect wear and tear of teeth like intraoral devices, oromyofunctional exercise, cognitive-behavioural therapies, meditation, hypnosis, sleep hygiene, biofeedback and or use of medications such as benzodiazepines, botulinum toxin etc.⁶

Treatment of bruxism in children are recommended to be initiated with psychological therapies as they do not evolve invasive treatments and further oral appliances are indicated for occlusal rehabilitation. This article's goal is to provide a clinical guideline for a thorough approach to treating bruxism in children.⁸

SYSTEMIC CONDITION ASSOCIATED WITH BRUXISM:

- **Attention-deficit hyperactivity disorder**

Attention-deficit/hyperactivity disorder (ADHD) is the most widespread behavioural disorder in children; estimates from community or primary care samples indicate rates range from 3 to 12 percent in school-aged children. The boy to girl ratio for ADHD ranges from 4:1 to 9:1, and it is a highly heritable illness.⁹ There is a higher prevalence of teeth grinding in children with ADHD. It is uncertain exactly causes bruxism to be more common in people with ADHD. One

possibility is that bruxism is often associated with increased psychological stress (such as anxiety), which may be more common in ADHD samples than in control samples.. Enuresis is extremely common in children with ADHD, which could make them more stressed out.¹⁰

- **Autism:**

Autism is a neurobehavioral and cognitive disease characterised by repetitive movements, limited interests, and impaired social and communication skill development. Temper tantrums, hyperactivity, a short attention span, impulsivity, agitation, anger, and a tendency for aggressive and self-destructive actions are some of the behavioural characteristics seen in children. Poor language and social communication, poor response to external stimuli, tendency to withdraw, and poor eye contact are all common signs. In addition, harmful oral behaviors such as teeth grinding, tongue thrusting, gum pinching, lip biting, and pica are commonly seen in children with autism.¹¹

- **Cerebral palsy:**

Cerebral palsy (CP) is a grave childhood disability caused by lesion in the developing brain that causes a non-progressive motor disorder of posture and movement. The most common disorders associated with CP are mental retardation, sensory restraints, epilepsy, speech defects, and hearing impairment. Among the more common oral manifestations in this children are Higher mean decaying, missing, and filled surfaces index, higher plaque index, tendency for delayed eruption of permanent molars, malocclusion, as well as high rates of bruxism.¹²

- **Down syndrome:**

Down syndrome (DS) is an congenital condition expressed because of the presence of an extra chromosome in pair 21, hence it is also called as trisomy 21. Children with DS have specific systemic manifestations such as: decrease in muscle tone, reduced immunity, and intellectual impairment. They also exhibit an increased incidence of oral manifestations namely missing or impacted teeth, crossbite, open bite, and other dental abnormalities.¹³ Additionally, in this children, sleep abnormalities are also common such as obstructive sleep apnea and bruxism. Physical and psychological illnesses that are present or linked to the syndrome may make sleep disturbances worse.¹⁴

- **Parkinson's disease:**

A chronic and progressive central nervous system disorder characterised by the malfunction and death

of vital nerve cells, resulting in a movement disorder. Levodopa, also known as L-DOPA, is commonly used to treat this condition. It is converted by the brain into dopamine, which aids in movement. Bruxism is a long-term side effect of the medication Levodopa.¹⁵

Clinical Manifestation of Bruxism

The clinical manifestation of this behaviour disorder tend to increase with age, frequency, duration and intensity of the muscle activity and is mentioned in the Table I.¹⁶

Table I – Clinical Manifestation of Bruxism

1	Increase sensitivity to heat and cold accompanied by pain in teeth.
2	Tension headaches accompanied by persistent muscle tension in the cranium and face.
3	Continues mechanical wearing of tooth surface may lead to exposure of dentine and hence tooth appears yellowish.
4	Microcracks on the enamel surface of the tooth.
5	Erratic mandibular motions that occur arbitrarily.
6	Increased mobility of teeth because of possible periodontal involvement.
7	Grinding sound of the teeth may be heard by the parents, friends or relatives.
8	TMJ may also be involved leading to stiffness and pain in the joint, further restricting mouth opening and difficult in chewing ; sometimes the damage may be so far that it requires a long time to heal.
9	A misalignment of the teeth brought on by unequal tooth wear.
10	Muscular hypertrophy in the masseter.

ASSESSMENT OF BRUXISM

Although bruxism is rarely a significant impairment, it can affect a person's quality of life, particularly if oral problems arise. Therefore, protecting the occlusion can be achieved in large degree by early detection and preventive interventions. They consist of questionnaires, clinical assessments, intraoral appliances, and electromyographic monitoring.¹⁷

Questionnaire Evaluation:

In both clinical and scientific settings, questionnaires are useful auxiliary tools. Large populations can benefit from this strategy, but it has certain subjective drawbacks. A substantial number of people do not recognise themselves as bruxers because they are unaware of their bruxism.¹⁷ Common questionnaire for detecting bruxers are

1. Have you ever noticed yourself grinding teeth especially while you are stressed?
2. Has anyone observed or overheard you clenching or grinding your teeth while you were awake?
3. Do you get headache after waking up from sleep?
4. Is your gums or teeth sore on awakening in the morning?
5. Have you experienced jaw pain in the early morning hours?

Yet pediatric dental practitioner cannot consider this as the main objective to diagnose the disorder as children are unable to identify with the symptoms associated with bruxism.⁵

Clinical evaluation:

A through case history, examination of tooth wear, movement of the teeth, and other TMJ clinical findings can all be used to identify bruxism.

1. Their parents have heard them making grinding or tapping noises in their teeth.
2. Tooth wear such as abfraction, abrasion, attrition, enamel wear, chipping, microfractures, etc.
3. Hypertrophy of the masseter muscle during voluntary contraction.
4. Morning stiffness and fatigue in the masticatory muscles.
5. Extremely sensitive teeth to cold substances
6. The locking or clicking of the temporomandibular joint.¹⁸

Intraoral Appliance:

Through an intraoral device, bruxism activity can be quantified and is divided into two categories.

- A. observation of the intra-oral appliance's wear aspects.
- B. Evaluate of bite force.

A. observation of the intra-oral appliance's wear aspects.

The acrylic resin occlusal splint showed signs of recurrent wear, according to Holmgren et al.,¹⁹ Koriath et al reported wear on full-arch acrylic occlusal stabilisation splints induced by parafunctional nocturnal dental activity.²⁰ Nonetheless, it is unclear whether these techniques are accurate.

- **Bruxcore plate:** A device placed inside the mouth called the Bruxcore Bruxism-Monitoring Device (BBMD) analyses bruxism activity while you sleep objectively. By counting the quantity of abraded microdots on its surface and determining the volumetric magnitude of abrasion, the Bruxcore plate measures the intensity of bruxism. The

BBMD is a four-layer, 0.51-mm-thick polyvinyl chloride plate with two alternating colours on each layer and a halftone dot screen on the top surface. The biggest drawback of this approach is that it is challenging to count the number of missing dots properly.⁴

B. Measurement of bite force

- **Intra-splint force detector:** Intra-splint force detector used as a sleep bruxism recording tool (ISFD). A thin, deformation-sensitive piezoelectric sheet was used to measure occlusal forces. This film was positioned 1 to 2 mm below the occlusal surface of a dental device manufactured of normal auto polymerizing acrylic resin. The ISFD was attached to an amplifier using a thin insulated wire. Both the masseter muscle EMG and the ISFD signals were recorded using a portable, battery-powered (4-channel) analogue signal recording device.²⁰

- When Hisahiro Takeuchi utilised piezoelectric film, he noticed that one of its limitations is that it is inaccurate at capturing prolonged force magnitudes. But for the target behaviours associated to bruxism, it seems to faithfully replicate above-baseline episodes with durations statistically indistinguishable from those obtained with masseter EMG (teeth grinding, clenching, and tapping). Masseter EMG had the weakest performance in spotting simulated side-to-side grinding motion.²¹

- **Electromyography (EMG):** The most popular method for determining the actual sleep bruxism activity is EMG recording. The main benefit is that bruxism may be detected without the use of intraoral devices that might alter normal bruxism activity. The portable EMG recording technique has shown to be more user-friendly and can measure masticatory muscle activity more precisely, enabling a more precise assessment of the number, duration, and severity of bruxism episodes. A surface EMG electrode with an integrated buffer amplifier and a cordless EMG measurement apparatus were developed in order to increase the reliability of recordings. Sleep bruxism events were tracked over time in patients' homes starting in the 1970s using battery-operated EMG recording equipment. The advantage of this EMG increased precision of the portable EMG recording equipment now make it possible to analyse the frequency, length, and intensity of bruxism occurrences with some degree of accuracy.¹⁸

- **Polysomnographic (sleep laboratory) recording:** Electroencephalogram, EMG, electrocardiogram, thermally sensitive resistor

(monitoring air flow), and electrocardiogram signals are frequently included in polysomnographic (sleep laboratory) recordings for sleep bruxism. Concurrent audio-video recordings are also frequently used.¹⁷ EMG activity in the masticatory muscles (masseter and/or temporalis) is used to assess sleep bruxism activity. Physiological alterations associated with sleep bruxism (e.g., microarousal, tachycardia, and sleep-stage shift) can also be observed. In conclusion, polysomnographic research enables multidimensional analyses of physiological behaviours related to sleep, and EMG-based sleep laboratory assessments have been shown to be extremely trustworthy. One notable downside is that bruxism behaviour might fluctuate depending on the sleeping environment.¹⁸

- **T -scan system:** The T-Scan Novus digital occlusion analysis system is used to investigate the sequence of occlusal contacts and their strength. The computerized occlusal analysis using T- scan possesses numerous additional advantages such as
 1. The T-scan system and its readings are not affected by salivation.
 2. It displays the occlusion and disocclusion time and bite forces in numerical value.
 3. It establishes the variations in forces from the first occlusal contact through maximum intercuspation till the last tooth contact numerically.

Bandodkar et al, using T-scan occlusal analyzer, found that the disocclusion time in children with bruxism was higher than healthy children. Gumus et al, observed that these children had greater occlusal contact in posterior region. But the occlusal contact in same patients were found to be similar to healthy individuals after treatment.²²

CURRENT TREATMENT APPROACHES OF BRUXISM:

- **Occlusal Therapy:** Occlusal splints have been suggested as the first line of treatment in cases of sleep bruxism to stop teeth grinding sounds and tooth wear facets. These mouthguards go by a variety of names, including occlusal device, bite plate, night guard, and bruxism appliance. Both hard and soft splints are used to treat them. hard splints are more effective at lowering bruxism activity.¹⁸

- **Behavioural modification:** Behavioural therapies include things like biofeedback, relaxation techniques, and better sleep hygiene. Both AB and SB patients can benefit from biofeedback, meditation and engaging themselves in high intensity workout and or sports by enabling them to

be self-aware, divert aggression or stress to a more positive and healthy lifestyle.⁴ Occupational therapy like cognitive-behavioural therapy, therapeutic exercise, sleep hygiene combined with muscular relaxation and massage techniques, hypnotherapy are some of the newer technique that are surfacing yet needs to be widely researched upon to incorporate in dental practice.¹⁷

Biofeedback: Bruxers can relearn their behaviour when a stimulus makes them aware of their unfavourable jaw muscle activities, in accordance with the theory behind biofeedback. Mittelman proposed an EMG approach that gives the daytime bruxer auditory input from their muscular activity, reflecting the level of muscle activity or relaxation that is taking place. Techniques employed in biofeedback strategies include the use of devices to awaken the patient during an SB episode using EMG feedback from auditory, vibrational, or electrical stimulation. Recently, a technique known as contingency electrical stimulation (CES) has been developed in an effort to lessen the masticatory muscle activity linked to sleep bruxism.¹⁸

Pharmacological Therapy: Medication like botulinum toxin has a paralytic effect on muscles in severe cases with comorbidities like coma, brain injury, amphetamine usage, Huntington's illness, and autism patients. It reduces acetylcholine release at the neuromuscular junction by reducing bruxism activity. The effectiveness of serotonergic and dopaminergic medications in the treatment of sleep bruxism has been the topic of numerous research. L-tryptophan, a precursor of serotonin, had no effect on the nocturnal EMG activity linked to bruxism in a placebo-controlled RCT. In contrast, a placebo-controlled randomised controlled trial (RCT) conducted in a sleep lab revealed that the catecholamine precursor L dopa has a minor, attenuating effect on sleep bruxism. Propranolol, a non-selective adrenergic beta-blocker, had no impact on sleep bruxism, according to Huynh et al. Medications used to treat bruxism include benzodiazepines, anticonvulsants, betablockers, serotonergic and dopaminergic drugs, antidepressants, muscle relaxants, and botulinum toxin.²³

CONCLUSION:

Bruxism is considered as a parafunctional and sleep related disorder and has a multifactorial cause that should not be underestimated by the pediatric dental practitioner. Pediatric dental surgeons should be knowledgeable about the causes, symptoms, types of therapy, and rehabilitation for

children who clench or grind their teeth. There is currently no such successful treatment to stop bruxism permanently. The primary goals of the therapeutic strategy are to cure and prevent harmful effects of bruxism on the masticatory apparatus structures. It should be highlighted that bruxism is a behavioural issue rather than an illness, and the clinician must be skilled in using a multidisciplinary approach to treatment to stop bruxism.

CONFLICT OF INTEREST:

Nil

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