

A Comprehensive Review on Bruxism

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Abstract

Bruxism is a habitual grinding of teeth when not chewing or swallowing, which can lead to tooth damage, headaches, and temporomandibular disorder. It can occur during wakefulness or sleep, with sleep bruxism being a semivoluntary activity during daytime. Bruxism is a sleep-related disorder, with psychosocial factors like stress playing little role in its etiology. There are no reliable methods for assessing bruxism in clinics, and tooth wear can also result from attrition, abrasion, and erosion. Devices like miniature self-contained EMG detector analyzers have potential if scientifically verified in large populations. In the absence of definitive evidence, bruxism can be managed through occlusal appliances, counseling, lifestyle changes, and pharmacological interventions.

INTRODUCTION

Bruxism is defined as habitual grinding of teeth when an individual is not chewing or swallowing. Tooth grinding is an activity particularly important to the dentist because of breakage of dental restorations, tooth damage, induction of temporal headache and temporomandibular disorder.[1,2]. Bruxism can occur during wakefulness or during sleep. Bruxism during daytime is commonly a semivoluntary 'clenching' activity during night is termed as 'sleep bruxism'. [3] According to American Academy of orofacial pain [4]: Bruxism is Defined as diurnal or nocturnal para-functional activity including clenching, bracing, gnashing and grinding of the teeth. The ICSD-R states that 90% of the general population grind their teeth to a degree at some point during their life, although only 5% will develop a clinical condition. Studies have reported that awake bruxism affects females more commonly than males while in sleep bruxism, males are equally affected as females.[5,6]

ETIOLOGY

Bruxism may be exhibited due to various factors, including local, systemic, physiological, and occupational factors. Local factors involve unconscious attempts to place teeth in contact during the transition from deciduous to permanent dentition and individual tooth planes. Systemic factors include gastrointestinal disturbances, nutritional

deficiencies, allergies, and endocrine disturbances. Physiological factors include anxiety, fear, stress, and emotional tension, while occupational factors include watchmakers and habitual chewers of tobacco, gum, tooth picks, or pencil. [7]

CLINICAL FEATURES

Bruxism can cause tooth wear, fracture, periodontal and muscle pain, and tooth mobility. Clinical evaluation is complex due to nocturnal para functional activity in both bruxers and normal individuals. Dental enamel is affected, with abnormal tooth wear being the most common. Bruxism can cause changes in the stomatognathic system structure, friction, inflammation, pulpal necrosis, and tooth mobility. It can also cause posture problems and affect masticatory and posture muscles of the cervical spine, potentially leading to chronic and permanent changes.[11]

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Bruxism causes grinding noise in long term causing periodontitis by affecting the periodontium, causing drifting of teeth and gingival recession. This can also lead to psychological and behavioral effects. Occlusal trauma, such as non-functional occlusal wear and increased tooth sensitivity, can result from bruxism. Musculature tenderness, muscle fatigue, and hypertrophy of the masseter muscle can also occur. Headache and chronic

headache can also occur. TMJ disorders can also be caused by grinding, leading to pain, cracking, and fractures. Restoration of cracked teeth can be achieved using dental crowns, veneers, and composite bindings. Cracked tooth syndrome (CTS) is characterized by sharp pain during chewing due to a hidden tooth crack. The symptom is sharp when biting down on an object, with fragments moving apart and reducing pressure in the pulp areas.[12,13]

Classification [3,8]

CLASSIFICATION	According to several criteria by when it occurs	Awake bruxism - This is presented when individual is awake.
		Sleep bruxism - This is presented when the individual is asleep.
		Combined bruxism - present in both conditions.
	By Etiology	Primary or idiopathic bruxism - no apparent cause known.
		Secondary Bruxism-Disease, medicinal products drugs.
	By Motor Activity Type	Tonic - Muscular contraction sustained for more than 2s.
		Phasic - Brief, repeated contraction of the masticatory musculature.
		Combined - Alternate tonic and phasic
	By of Period of Occurrence	Past bruxism
		Current or present bruxism
	By Severity	Mild - occurring less than nightly
		Moderate- occurring nightly
		Severe- occurring nightly and with damage to the tooth.
	By Duration	Acute
		Subacute
		Chronic

Figure 1. Classification of Bruxism



Figure 2. (a) comparison of teeth in healthy and bruxism patient (b) Severe loss of crown structure due to bruxism

RADIOGRAPHIC FEATURES

Radiographic examinations reveal changes in periodontal space, root resorption, root fractures, and pulp stones in bruxers. Bruxism is associated with cortical shape, mental index, Ante gonial index, gonial index, and ante gonial notch depth. Bruxers also have more prevalent semilunar defects, cortical residues, and porosity in the industrial cortex of the mandible. Bruxism reduces fractal dimension in the condylar region. Bruxers show tiny bone peaks in

the cortex of the mandibular gonial region at a higher rate than non-bruxers. Excessive bite force in bruxers may explain the higher and Linny bone peaks. Cortical thickening in the mental region may be due to endosteal bone damage caused by premolar teeth in bruxers. [14] Antegonial notch depth (AND), a distance from the mandibular inferior border notch concavity to the inferior border of the mandible, was used to assess morphological changes in bruxers. Results showed increased AND in

bruxers, particularly in males, with higher values for gonial index and antegonial notch depth. Radio morphometric

variables, AND, and periodontal disease rates were compared between bruxers and non-bruxers. [15]

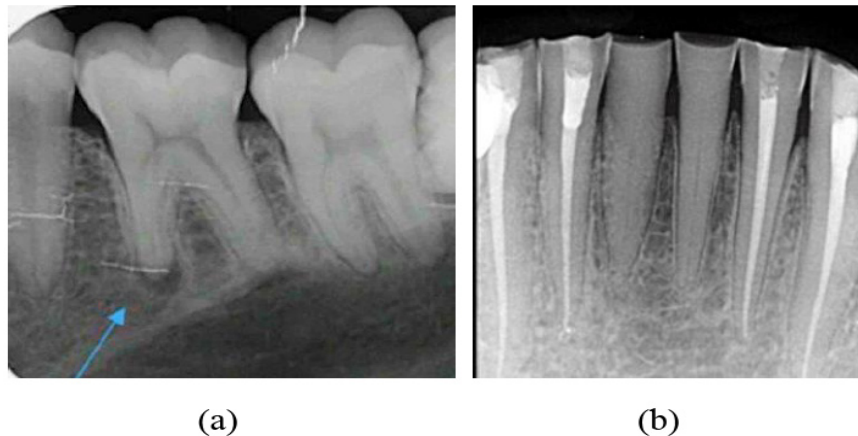


Figure 3. Radiographic features of bruxism (a) & (b)

CLINICAL EXAMINATION AND DIAGNOSIS

The diagnosis of bruxism is based particularly on history, tooth mobility, tooth wear and other clinical findings.

Tooth Wear

An analog to bruxism, featuring systems designed to identify and measure incisal and occlusal tooth wear. A tooth wear index has been developed for the examination of incisal and occlusal wear. [15]

Intraoral Appliance

Evaluation of bruxism activity using intraoral appliances, classified into two methods: observing wear facets of the appliances and measuring bite force. [16]

Brux Core Plate

Introduced as a device for measuring sleep bruxism activity, it evaluates this activity by counting abraded microdots and scoring the volumetric magnitude of abrasion. [17]

Detection of Bite Force

Intra-splint force detector (ISFD) is used to measure the force generated by tooth contact on dental appliances.

T-Scan

Computerized occlusal analysis system for dynamic assessment of bite force distribution, contact timing, and occlusal balance. Provides real-time, quantifiable data on occlusal force and timing. Enhances diagnostic accuracy, improves patient outcomes, and reduces guesswork in occlusal adjustments. The diagnosis of bruxism is based particularly on history, tooth mobility, tooth wear, and other clinical findings.[18]

Electromyography (EMG)

It's a technique that records and evaluates muscle activity, used diagnostically and therapeutically for conditions like TMJ problems, bruxism, and myofascial pain, by assessing muscle function and activity during chewing, biting, and other related activities.

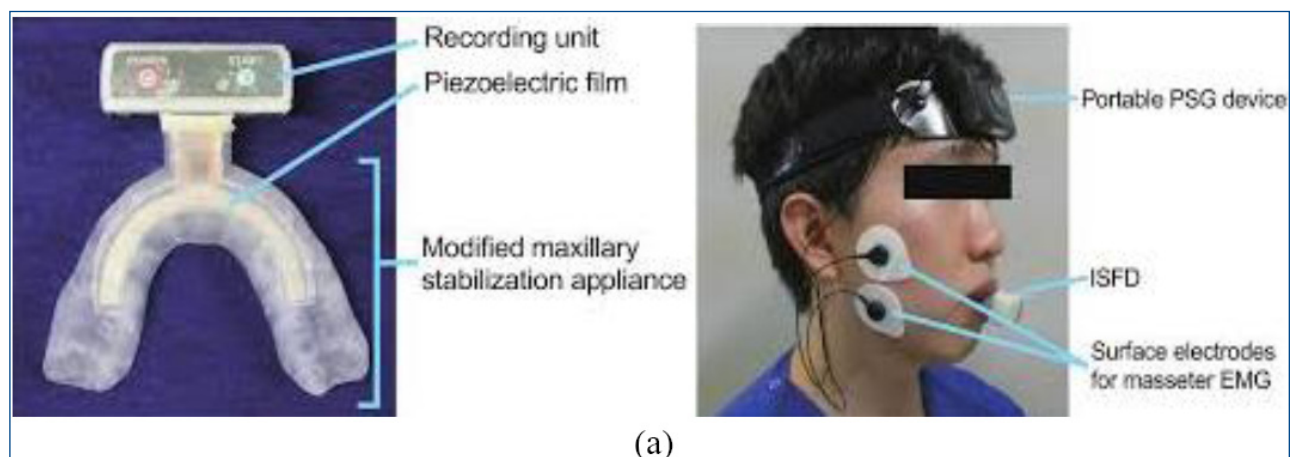




Figure 4. (a) Intra-splint force detector (ISFD) (b) EMG-EKG electromyography (c) Smart mouth guard (d) T-scan

CONSEQUENCES OF BRUXISM

1. Dental Consequences

- Excessive tooth enamel wear can cause sensitivity, fractures, and abfraction lesions wedge-shaped defects near the gum line. Severe cases may expose the pulp, causing inflammation and necrosis. Dental restorations may fail prematurely due to excessive forces. [2-6]

2. Temporomandibular Joint (TMJ) Disorders

- Chronic grinding places immense stress on the TMJ, leading to myofascial pain, jaw stiffness, and difficulty in mouth opening. TMJ dysfunction can result in disc displacement, causing chronic pain and functional impairment. [19]

3. Periodontal and Soft Tissue Effects

- Excessive occlusal forces can contribute to gum recession, exposing tooth roots and increasing tooth mobility. Soft tissue trauma, such as tongue and cheek

biting, is common in bruxism patients.[20]

4. Orofacial and Headache Issues

- Chronic tension-type headaches due to overuse of masticatory muscles. Persistent facial pain and referred pain in the ear due to TMJ dysfunction.

5. Sleep Disturbances and Psychological Effects

- Sleep bruxism disrupts sleep patterns, leading to poor sleep quality and daytime fatigue. Individuals with sleep bruxism may experience difficulty concentrating, heightened irritability, and mood disturbances. [21]

6. Systemic Health Implications

- Bruxism is often linked to other sleep disorders and may contribute to cardiovascular issues like hypertension and elevated heart rate. [22]

MANAGEMENT OF BRUXISM

The bite direction and size of the crack or fracture dictate the choice of treatment. It ranges from stainless steel

band or crown to endodontic treatment and restoration. If untreated conditions can lead to severe pain, possible pulpal problems and periapical abscess.

1. Counselling and Behavioral Interventions

- Address lifestyle factors contributing to bruxism. Advise good sleep hygiene, reduce stress, and avoid stimulants such as caffeine, alcohol, and tobacco before bedtime.[23] Stress management techniques include cognitive behavioral therapy, relaxation exercises, and habit modification. [24]

2. Occlusal Therapy

- Classified into hard splints and occlusal appliances. Used to prevent tooth wear caused by bruxism. [25,26]

3. Behavioral Modification

- Psychoanalysis, hypnosis, progressive relaxation, meditation, self monitoring, sleep hygiene, and habit reversal.

4. Medication

- Use of Antianxiety agents, tranquilizers, sedatives, and muscle relaxants like diazepam. Low doses of tricyclic antidepressants may inhibit the amount of rapid eye movement (REM) sleep. [27]

5. Botulinum Toxin Therapy

- Targets the masseter and temporalis muscles, reducing their contraction strength and force of grinding. May help relieve muscle pain and improve patient satisfaction. However, its use should be approached with caution due to potential adverse effects and the need for repeated treatments every few months.

6. Investigational Therapies

- Contingent electrical stimulation, acupuncture, alternative therapies, and lifestyle modifications.

A multidisciplinary approach is required, tailored to the patient's underlying risk factors and severity of symptoms.[27]

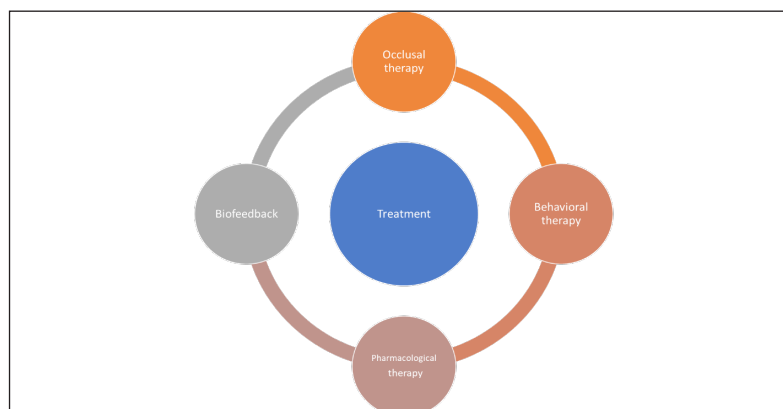


Figure 5. Treatment options for managing bruxism

CONCLUSION

Bruxism is a sleep-related disorder. Studies indicate that bruxism is a centrally mediated disorder, and psychosocial factors like stress have little role in the etiology of bruxism. There are no reliable methods for assessing bruxism in the clinic that have reasonable diagnostic validity. Tooth wear is considered analogous to bruxism, but it can also be the result of attrition, abrasion, and erosion. Devices such as miniature self-contained EMG detector analyzers have potential if they are scientifically verified in large populations and proven to be useful in clinics in terms of ease of use. In the absence of definitive evidence, bruxism can be best managed by occlusal appliances, counseling, changes in lifestyle, and pharmacological interventions.

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