

## Bruxism – Literature review

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### Abstract

**Introduction:** Bruxism is an oral parafunction prevalent in all age groups which is characterized by the involuntary teeth grinding and/or clenching that may occur at any time of the day. It has a multifactorial etiology associated with occlusal and psychological factors and / or habits that can compromise the orthognatic system that may bring negative consequences.

**Objective:** To make a revision article from the existing literature on the etiological factors, clinical manifestations and treatment of bruxism.

**Materials and methods:** Data search was accomplished using Pubmed and ScienceDirect databases applying the keywords “bruxism”, “etiology and symptoms”, “attrition injuries”, “teeth grinding”, “muscular-articular disorders”, “TMJ dysfunction”. From the 102 articles, after analysis of all the abstracts, 34 articles and 4 textbooks were included.

**Results:** The main consequences of bruxism are muscle fatigue, pain, use of incisal edges and occlusal surfaces of the teeth, and in more severe cases teeth loss, headache, periodontal lesions and temporomandibular joint disorders (TMJ disorders). These clinical manifestations may increase the difficulty of oral rehabilitation of edentulous areas and teeth restoration. They may also cause vertical dimension loss and the decrease of patients' quality of life. Early diagnosis and identification of the etiologic factors are important to prevent the progression of lesions in the orofacial structures such as pain relief of the craniofacial muscles, restoration of the lost structures and reestablishment of vertical dimension.

**Conclusion:** Bruxism presents a high frequency in all age groups and has become an important oral health issue. This parafunctional habit consists in an important change in the oral sensory-motor system, requiring a multidisciplinary approach, in order to reduce injuries in osteo-dental structures. Lately, its prevalence has increased and is associated with several factors such as stress, drugs, anxiety and sleep disorders, among others. The dentist should be aware of the signs and symptoms in order to prescribe the best treatment, providing the patients a better quality of life.

**Keywords:** Bruxism; Teeth grinding; Muscular-articular disorders

### Introduction

Bruxism is a common condition and the majority of the population, at some point in their life, will grind or clench their teeth. However, this parafunctional habit is characterized by its intensity and periodic repetition. This condition tends to reduce with age and it is observed an impartial distribution [1].

In most cases, the parafunction is known when the patient goes for the first time to the dentist. One of its most prominent clinical signs is the abnormal tooth wear, caused by teeth grinding and clenching. This is not a decisive sign for bruxism, because tooth wear can occur when eating acidic foods or by incorrect tooth brushing (erosion and/or dental abrasion). Thus, we must see the evidence of antagonist teeth wear [2].

Other clinical signs are teeth fractures and/or fillings, root fractures, tooth mobility, pain, hypertrophied facial muscles and reduced capacity to open the mouth upon awaking, frequent headaches, especially in the temporal muscle region [3].

### Materials and Methods

It was carried out a bibliographic review on bruxism: its classification and etiological factors as well as major clinical manifestations into the oral cavity, using PubMed and ScienceDirect databases. The keywords used were “bruxism”, “etiology and symptoms”, “attrition injuries”, “teeth grinding”, “muscular-articular disorders”, “TMJ dysfunction” and their

combinations. From the 102 articles, after analysis of all the abstracts, 34 articles and 4 textbooks were included.

Selection criteria included articles describing its consequences, prevalence, clinical manifestations and treatment. These articles, all in English, were available from the databases mentioned before.

### Results

Bruxism can be defined as a parafunctional activity of the masticatory system which includes teeth clenching and grinding at a subconscious level, where the neuromuscular protective mechanisms are absent. This may cause injuries in the masticatory system and TMJ disorders [4].

These episodes are highly variable in a patient, being also highly variable among different patients [4]. Nocturnal grinding may take 5 to 38 minutes per night and during parafunctional activity tooth contact force can be three times higher than the functional activity of the masticatory system. This may cause collapse of the structures involved [5].

Some authors describe bruxism as an orofacial motor activity during sleep, characterized by repeated or sustained contractions of mandibular elevator muscles, which may cause strong muscle rigor, around 150-340 kg punctiform charge during active periods, resulting in fracture and teeth wear, periodontal problems, pain, muscle fatigue and headaches [5].

The oldest references on bruxism are described in the Bible, which

associate teeth grinding with pain and the “first punishment from God” [6]. According to Dorland’s Illustrated Medical Dictionary, the word bruxism comes from the greek brychein, meaning teeth grinding [7].

Bruxism is one of the most prevalent, complex and destructive dental functional disorders [8]. Thus, bruxism can be classified according to the degree of severity, as moderate, severe and extreme, where there are evidences of lesions on the stomatognathic system structures [5].

It can also be classified as centric and eccentric [5]. Centric bruxism consists in a continuous clenching of teeth, for a given period, with destruction of their supporting structures, but also conditions involving masticatory muscles and temporomandibular joint. In eccentric bruxism, there are isotonic muscle contractions and wear of the incisal edges of the teeth, particularly in the anterior arch [8]. However, not all cases with wear of incisal edges result from this parafunctional activity, it may be associated with other habits such as nail biting, biting objects, among others [5].

Bruxism is also classified as chronic, acute and sub-acute. Literature states that an occlusal disharmony interferes in bruxism when the patient exhibits signs and/or muscular symptoms. This occurs in centric relation and/or in functional lateral and protrusive phases [9-11].

Some authors classify bruxism as diurnal and nocturnal, each one having different causes [4,5]. In other words, bruxism that occurs during the day (DB) and bruxism that occurs during sleep (SB) are different clinical entities that arise in different states of consciousness and have different etiological factors. Therefore, they should be distinguished, requiring different treatment plans [12].

DB and SB are classified as primary when no clear medical cause, systemic or psychiatric, is present. Secondary bruxism comes associated with a clinical disorder, neurological or psychiatric, connected to iatrogenic factors or any other sleep disorders [5,13] (Table 1).

## **Etiological Factors**

Body organic functions are mainly controlled by the central nervous system (CNS), through voluntary and involuntary actions. Involuntary actions are controlled by the autonomic nervous system (ANS), divided into sympathetic and parasympathetic. The sympathetic system works in stressful situations while the parasympathetic works in rest situations. During sleep there is a predominance of the parasympathetic activity. However, in sleep-onset rapid eye movement (REM), that occurs 6-8 times during sleep, there is a decrease of the parasympathetic activity and is observed an increased sympathetic activity [14]. Thus, bruxism events are associated with the change from deep sleep to light sleep, usually during stages 1 and 2 of non-REM sleep [5].

Bruxism etiology is multifactorial [4,15,16]. The psycho-emotional is considered one of the most important etiological factors. It may be related to bruxers’ mental health disabilities, since they use their stomatognathic system to “discharge” their aggressiveness [17-23]. However, its etiology is also related to local, systemic [19] and neurological factors [6].

On the one hand, local factors include traumatic occlusion, dental trauma, premature contact, excess restorations, dentigerous cysts, atypical eruption of deciduous and permanent teeth. Malocclusions, incorrect restorations, periodontal calculus, tooth mobility, lip deformities, gingival hyperplasia and other factors related to occlusal physiology, favor its establishment [24,25]. On the other hand, systemic factors include nutritional deficiency, parasitosis, Down’s syndrome, gastrointestinal disorder, allergic reactions, drugs, uncontrolled enzymatic digestion, brain damages, drug side effects, mental retardation and a cerebral palsy [26].

Nutritional factors such as consumption of xanthine beverages (coffee, tea, chocolate, soft drinks) and smoking habits can also be involved, since they stimulate the central nervous system, increasing anxiety and stress, and therefore trigger bruxism [5,26].

Regarding allergies and intestinal parasites, there are several studies focusing on explaining the relation of these disorders with bruxism. However, there is in fact intimate relation between IgE levels, eosinophilia and bruxism. Both in allergies and intestinal parasites infections, IgE and eosinophilia levels are high and oral manifestations occur [24].

Bruxism was also detected in patients with neurological disorders, taking neuroleptic and anticonvulsants drugs, as well as in patients with brain abnormalities, taking levodopa [8]. Risk factors include the use of stimulants such as amphetamines and antidepressants [27] and, recently, the main cause of this parafunction is considered to be a sleep disorder, explained by the arousal theory [28].

Besides local and systemic risk factors, there are the occupational ones, like practicing competitive sports [5] (Table 2).

## **Clinical manifestations and symptoms**

Its diagnosis and clinical evaluation is complex, because both bruxers and normal individuals may show some nocturnal parafunctional activity [5].

Diagnosis must be focused on identifying the signs and symptoms reported by the patient or by the dentist over the clinical examination [10].

Dental enamel is the first structure affected from the parafunctional load and abnormal wear of the teeth is the most common evidence of this condition. It may be restricted to a single tooth or the entire mouth [29,30].

Radiographic examination can show the loss of the lamina dura, changes in the periodontal space, which can either disappear or be increased, root resorption, root fractures and pulp stones [5].

The major lesions caused by bruxism can be gathered as: effects on teeth, periodontium, masticatory muscles and TMJ, headaches, behavioral and psychological effects. Other signs and symptoms are parafunctional hypermobility in the absence of periodontal disease, pulpitis, toothache (with normal pulp), partial crown fractures and teeth migration. Muscular symptoms include fatigue, increased tension in masticatory muscles, especially the lateral pterygoid muscle, mandibular elevator muscles, masseter and temporal [5].

The most common muscular symptom is fatigue, which is the inability to resist during a sustained effort without having apparent signs and symptoms of pain and discomfort [4,31]. Bruxism can also cause posture problems. In addition, it can affect masticatory muscles and postural muscles of the cervical spine, which may cause muscular pain and future chronic permanent changes [15].

Bruxism harmful habit causes relevant changes in the stomatognathic system structure. It causes friction, inflammation, pulpal necrosis and teeth mobility.

It may occur muscle pain and tenderness to palpation and TMJ pain and noises due to lack of coordination of the lateral pterygoid muscles or alter the articular heads, as well as the vertical dimension loss and mandibular displacement in maximal intercuspal position (MIP) [32].

## **Treatment**

Depending on the etiology, signs observed during the clinical examination and symptoms described by patients, the treatment changes. Furthermore, it is important to make a differential diagnosis [8].

<b>Classification of Bruxism</b>	
<b>Primary or idiopathic bruxism</b>	<ul style="list-style-type: none"> <li>• <u>Peripheral</u>: occlusal factors</li> <li>• <u>Central</u>: SNc aminergic disorder</li> </ul>
<b>Physiological</b>	<ul style="list-style-type: none"> <li>• Usual habit in mixed dentition</li> </ul>
<b>Secondary</b>	<ul style="list-style-type: none"> <li>• <u>Associated with certain medications or other substances</u>:                             <ul style="list-style-type: none"> <li>- Antidepressant selective serotonin reuptake inhibitors;</li> <li>- Inhibitors of calcium channels;</li> <li>- Levodopa;</li> <li>- Antidopaminergic Drugs;</li> <li>- Antipsychotics;</li> <li>- Amphetamines;</li> <li>- Substances related to amphetamines;</li> <li>- Caffeine;</li> <li>- Cocaine;</li> <li>- Smoking;</li> <li>- Alcohol.</li> </ul> </li> <li>• <u>Associated with sleep disorders</u>:                             <ul style="list-style-type: none"> <li>- Restless leg Syndrome;</li> <li>- Periodic limb movement disorder (PLMD);</li> <li>- REM Sleep behavior disorder;</li> <li>- Obstructive sleep apnea.</li> </ul> </li> <li>• <u>Associated with neurological disorders</u>:                             <ul style="list-style-type: none"> <li>- Oromandibular dystonia;</li> <li>- Huntington's disease;</li> <li>- Hemifacial spasm;</li> <li>- Parkinson's disease;</li> <li>- Tardive Dyskinesia post neuroleptic;</li> <li>- Gilles de la Tourette Syndrome;</li> <li>- Multiple System Atrophy;</li> <li>- Olivopontocerebellar atrophy;</li> <li>- Dementia;</li> <li>- Cerebellum hemorrhage;</li> <li>- Myofascial Pain Syndrome</li> <li>- Intellectual disability;</li> <li>- Hyperactivity;</li> <li>- Rett Syndrome;</li> <li>- Coma;</li> <li>- Post Anoxic Encephalopathy;</li> </ul> </li> <li>• <u>Associated with psychiatric disorders</u>:                             <ul style="list-style-type: none"> <li>- Schizophrenia;</li> <li>- Bulimia nervosa.</li> </ul> </li> <li>• <u>Other diseases</u>:                             <ul style="list-style-type: none"> <li>- Myofascial Pain</li> <li>- Sjogren Syndrome.</li> </ul> </li> </ul>
<b>Contraction</b>	<ul style="list-style-type: none"> <li>• Centric</li> <li>• Eccentric</li> </ul>
<b>Duration</b>	<ul style="list-style-type: none"> <li>• Acute</li> <li>• Subacute</li> <li>• Chronic</li> </ul>

**Table 1:** Classification of bruxism.

Treatment demands a multidisciplinary approach, involving Psychology, Physiotherapy and Speech Therapy, having in consideration oral, medical and psychological aspects of the patient [5].

Treatment plan should attend the following objectives: physical and psychological stress reduction, treatment of signs and symptoms, reduce occlusal interferences and change the patient's usual neuromuscular pattern [1].

The starting point for treatment aims to decrease psychological stress using relaxation exercises, massage and physiotherapy [33]. This treatment reduces the symptoms but not the cause. The habit may restart whenever the patient's tolerance regarding an occlusal change decreases [5].

Specific treatment for muscle pain is based on methods that disrupt mechanisms of pain cycle, as myofascial trigger point therapy (cool mist spray), anesthetic block in association with physiotherapy techniques such as exercise to restore function and deep heat massage [5].

Occlusal therapy may include occlusal adjustment. Although occlusal condition exerts minor influence on the process, occlusal adjustment, irreversible therapeutic method, is suitable to minimize damages caused by teeth grinding but not for treating bruxism [5]. The use of interocclusal splints reduces symptoms, even if it has not stopped bruxism, because they act in TMJ, inducing the condyle to stand correctly in the condylar fossa. The distribution of masticatory forces are responsible for the relief of symptoms [34,35]. The splints may differ

Morphological factors	Neurophysio pathological factors	Psychological factors	Others
<ul style="list-style-type: none"> <li>Occlusal factors</li> <li>TMJ disorders</li> </ul>	<ul style="list-style-type: none"> <li>Sleep disorders</li> <li>Change in dopaminergic neurotransmission</li> <li>Stress</li> <li>Drugs consumption</li> <li>Smoking</li> <li>Alcohol</li> </ul>	<ul style="list-style-type: none"> <li>Emocional strain</li> <li>Stress</li> <li>Anxiety</li> <li>Anger</li> </ul>	<ul style="list-style-type: none"> <li>SNc pathologies</li> <li>Genetics</li> </ul>

**Table 2:** Main etiologic factors of bruxism.

in material, rigid or resilient, and in structure, thickness and occlusal coverage extension. Thus, according to therapeutic indication, the splits may set different intermaxillary relations [1,3,25].

Depending on the complexity of the case, it is usually recommended its use at night, for 45 days, with weekly maintenance. Despite its etiology, occlusal therapy can always be suitable, because it promotes functional comfort, preventing further damage to the components of the masticatory apparatus<sup>6</sup>. Pharmacological treatment with drugs such as dopamine agonists, anxiolytics, buspirone, nonbenzodiazepines hypnotics, antiepileptics and botulinum toxin, is appropriate when bruxism is intense [2,20,21,22].

## Discussion

Early diagnosis of bruxism is necessary in order to avoid damage to the TMJ and other oral and face structures such as teeth and masticatory muscles. The possible lesions caused by bruxism may easily effect the quality of life of patients, mainly because of its high association with pain and discomfort [36]. A diagnosis of bruxism is usually made clinically and is mainly based on the patient's clinical history and the presence of typical signs and symptoms, including tooth mobility, tooth wear, masseteric hypertrophy, indentations on the tongue, hypersensitive teeth, pain in the muscles of mastication, and clicking or locking of the TMJ [36].

However, it is important to understand that bruxism is not the only cause of tooth wear. Another possible cause of tooth wear is acid erosion, which may occur in people who drink a lot of acidic liquids such as concentrated fruit juice, or in people who frequently vomit or regurgitate stomach acid. People also demonstrate a normal level of tooth wear, associated with normal function. The presence of tooth wear only indicates that it has occurred at some point in the past, and does not necessarily indicate that the loss of tooth substance is ongoing. People who clench and perform minimal grinding will also not show much tooth wear [37].

The most usual trigger in sleep bruxism that leads a person to seek medical or dental advice is being informed by sleeping partner of unpleasant grinding noises during sleep. The diagnosis of sleep bruxism is usually straightforward, and involves the exclusion of dental diseases, temporomandibular disorders, and the rhythmic jaw movements that occur with seizure disorders. This usually involves a dental examination, and possibly electroencephalography if a seizure disorder is suspected.

Tooth wear may be brought to the person's attention during routine dental examination. With awake bruxism, most people will often initially deny clenching and grinding because they are unaware of the habit [38].

This literature review was performed using the main scientific databases in order to better understand the principle guidelines about this important oral health issue. An overview about bruxism will surely help dental professionals understand the main keypoints about diagnosis, risk factors and preventive and treatment methods used nowadays. As all oral health diseases, prevention should be considered fundamental when treating bruxism, so that the development oral diseases and other complications and may be avoided.

## Conclusion

Bruxism presents a high frequency in all age groups and has become an important oral health issue. This parafunctional habit consists in an important change in the oral sensory-motor system, requiring a multidisciplinary approach, in order to reduce injuries in osteo-dental structures.

Lately, its prevalence has increased and is associated with several factors such as stress, drugs, anxiety and sleep disorders, among others. During the clinical examination, the dentist should be aware of the signs and symptoms described by patients, in order to make an effective differential diagnosis and determine the correct treatment, providing the patients a better quality of life.

However, prevention should be always considered in order to avoid temporomandibular disorders and other oral pathologies that may have bruxism as one of the main etiological risk factors.

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