

*Review Article*

## **Bruxism: Diagnosis and Management**

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*Received: 10/11/2014**Revised: 09/12/2014**Accepted: 17/12/2014*

### **ABSTRACT**

Parafunctional habits are potential source for trauma for occlusion. Bruxism is a pathologic activity of the stomatognathic system that involves teeth grinding and clenching. It can cause mobility, wear, fracture of tooth & restorations. Also may lead to periodontal & muscle pain and may contribute to masticatory system disorder. A maxillary or mandibular stabilization appliance is generally considered the most effective mean of managing bruxism. So splint therapy can be used to reduce the trauma from occlusal forces & to improve patients comfort. There is a large scale of different etiological and therapeutic approaches presented in scientific literature, but the main problem - bruxism in every day practice often remains undetected and badly treated. This review attempts to explain about diagnosis and management of parafunctional habits.

**Key words:** Bruxism, sleep period, biofeedback, occlusal appliances.

### **INTRODUCTION**

Bruxism is a pathological activity of the stomatognathic system that involves tooth grinding and clenching during parafunctional jaw movements. The term bruxism comes from the old Greek word brychein– the grinding of teeth. In scientific writings, the term bruxism was first used by Marie and Pietkiewitz in 1907. The American academy of orofacial pain defines bruxism as “Diurnal or nocturnal activity which includes clenching, gnashing, gritting and grinding of teeth. It can be clinically diagnosed based on presence of excessive tooth wear which could not have been caused by mastication.”

Bruxism is an oral movement disorder that is characterized by grinding or clenching of the teeth. The disorder may occur during sleep as well as during wakefulness and has an estimated prevalence in the general adult population of approximately 8-10%. [1]

The etiology of bruxism has multifactorial nature. In the past, peripheral factors like occlusal discrepancies and deviation in orofacial anatomy have been considered the main causative factors. Nowadays such factor plays a minor role. Recent focus is more on central factors. Psychosocial and pathophysiological factors are frequently mentioned in relation to bruxism.

Bruxism should be diagnosed along multiple axes. viz. questionnaires, an oral history taking, extraoral and intraoral inspection for clinical signs of bruxism.

### ***Etiology***

The cause of bruxism is still controversial. Current reviews indicate that the etiology is not fully known but it is probably multifactorial. [2,3]

Basically three groups of etiological factors can be distinguished; morphological, pathophysiological and psychological factors. [4]

### ***Morphological factors:***

Occlusal interference was formerly considered the most important etiological factor for bruxism.

### ***Pathophysiological factors:***

Pathophysiological factors are suggested to be involved in the precipitation of bruxism. For example, bruxism has been linked to sleep disturbances, altered brain chemistry, the use of certain medications and drugs, smoking, the consumption of alcohol, and certain trauma and diseases. [1,5]

As bruxism often occurs during sleep, the physiology of sleep has been studied extensively.

‘Arousal response’ has been the subject of many studies. [6] An arousal response is a sudden change in the depth of sleep, during which the individual either arrives in a lighter sleep stage or actually wakes up. [7] Such a response is accompanied by gross body movements (e.g. turning), an increased heart rate, respiratory changes, peripheral vasoconstrictions and increased muscle activities. Macaluso et al showed that in 86% of cases, bruxism episodes were associated with an arousal response. [8]

The sleep period is characterized by a partial reduction (NREM sleep) and a total reduction (REM sleep) in motor activity, axial skeletal neuromuscular and masticatory tone. [9] Phasic orofacial muscular activity remains during NREM

sleep. Such activity is termed rhythmic masticatory muscle activity during sleep (RMMA). [10] RMMA is a normal and automatic activity of the masticatory muscular system. It shows a characteristic coactivation pattern of opening and closing of the jaw muscular system followed by salivation and swallowing. [11,12] RMMA frequency in sleep bruxism sufferers is three to eight times greater than in normal. Teeth contact during RMMA episodes generates a physical strength which may range from 300 to 8000 g. [13]

Recently it can be derived that certain disturbances in the central neurotransmitter system may be involved in the aetiology of bruxism. [14]

It is hypothesized that the balance between the direct and indirect pathways of the basal ganglia, a group of subcortical nuclei that are involved in the coordination of movements, is disturbed in bruxers. The direct output pathway goes directly from the (one of the five basal ganglia) to the thalamus, from where afferent signals project to the cerebral cortex. The indirect pathway, on the other hand, passes by several other nuclei before the thalamus is being reached. If there is an imbalance between both pathways, movement disorders are the result, like Parkinson's disease. [15]

The imbalance goes with disturbances in the dopamine-mediated transmission of action potentials. In case of actual nigrostriatal degeneration, Parkinson's disease emerges because of a lack of endogenous dopamine, which can be influenced by pharmacological therapy. In case of bruxism, there may be an imbalance between both output pathways without signs of degeneration of the nigrostriatal feedback loop. The chronic (long-term) use of L-dopa, neuroleptics are known to cause bruxism. [14]

Selective serotonin reuptake inhibitor (SSRI) medications have been reported to encourage bruxism. [16]

SSRI acted on the brain to raise levels of the neurotransmitter serotonin without raising the levels of norepinephrine. This was thought to be a benefit in treatment of depression, anxiety, panic disorder. [17]

**Psychological factors:**

There is common belief that psychological stress contributes to bruxism.

A controlled questionnaire study by Olkinuora (1972) demonstrated that bruxers can be considered emotionally out of balance and that they tend to develop more psychosomatic disorders. [18] Kampe et al.(1997) also demonstrated more anxiety in a group of bruxers. [19]

Hypothetically, behavioral factors, such as anxiety, tension, negative emotions and frustrations would cause an increase in activity of the hypothalamic pituitary adrenal axis, with an increase in ACTH, cortisol and adrenaline secretion by suprarenal glands, both during sleep and wakefulness. [20]

Release of adrenaline by suprarenal glands would facilitate an increase in neuromuscular tonus, reduction in the saliva secretion rate, both during sleep and wakefulness, and tonic increase in basal activity of the sympathetic nervous system, with a subsequent increase in the frequency of RMMA episodes and teeth grinding during sleep.

**Diagnosis**

Diagnosis of bruxism is based on its case records, symptoms and changes it causes in the masticatory system and surrounding structures. [21]

**Patient history:**

The history of the patient as well as the personal interview of the patient is required to know the details of the case.

A. Clinical examination:

The examinations for the signs and symptoms of the patient include the following:

1. Observations and measurement of full range of motion of the mandible. Observation of departure from a straight path of opening and closing of the mandible is analyzed with an average maximal opening of 50 mm.
2. Auscultation and light palpation of each TMJ. Auscultation with help of stethoscope for the joint sounds and any changes such as clicks, pops, crepitus are recorded.
3. Load testing of each TMJ. Essential testing for the palpation of head of condyle, surface of glenoid fossa and the tissue interposed in between where bimanual palpation is done.
4. Palpation of each muscle of mastication. Palpation of the muscles of mastication for any elicitation of tenderness or pain.
5. Evaluation of all soft tissues of the face and oral cavity. Surrounding soft tissues have to be evaluated for any discomfort and any radiating pain.
6. Periodontal and dental examinations. Thorough examination of the periodontal status and the dental examination has to be carried out.
7. Complete occlusal analysis, including accurately mounted diagnostic models: comprehensive analysis of the patient for the type of occlusion, interocclusal rest space, opening and closing patterns, occlusal curves, centric relation, the intercuspal position, protrusive movement, and right and left laterotrusive movements should also be analysed.

## **Management**

### **Behavioural approaches:**

#### *Biofeedback*

This technique has been applied for bruxism during wakefulness as well as for sleep bruxism. While awake patient can be trained to control their jaw muscle activities through auditory or visual feedback. For sleep bruxism auditory, electrical, vibratory or taste stimuli can be used for feedback. [22]

#### *Other behavioural approaches*

Other behavioural approaches include psychoanalysis, hypnosis, progressive relaxation, meditation, self-monitoring

### **Occlusal approaches:**

Two categories of occlusal management strategies for bruxism can be distinguished: true occlusal interventions and occlusal appliances. [22]

#### *True occlusal interventions*

This category includes approaches like occlusal equilibration, occlusal rehabilitation and orthodontic treatment.

#### *Occlusal appliances*

The most widely known and used therapeutic means is an occlusal appliance (splint). An occlusal appliance is a removable device, usually made of hard acrylic that fits over the occlusal and incisal surfaces of teeth in one arch creating precise occlusal contact with teeth of opposite arch. These splints have had different names (eg. Occlusal bite guard, bite plate, night guard, occlusal device) and slightly different appearances and properties. They are commonly used to prevent tooth wear caused by bruxism and/or heavy loading. [23]

Occlusal appliances have several uses. One of which is to temporarily provide an occlusal condition that allow the temporomandibular joint to assume the most orthopedically stable joint position. To reduce abnormal muscle activity while encouraging more normal function. To protect teeth and supportive structures from abnormal forces.

Types of occlusal appliances that are used in management of parafunctional habits are

#### *Stabilization appliance:*

Generally located on maxillary arch. When it is in place the condyles are in their most musculoskeletally stable position at the time the teeth are contacting evenly and simultaneously. [24]

#### *Anterior bite plane:*

It is hard acrylic appliance worn over the maxillary teeth providing contact with only mandibular teeth. Its primary purpose is to disengage the posterior teeth and thus eliminate their influence on the function of masticatory system. Parafunctional activity can be treated with it. [25] It is indicated to use for short period of time as the unopposed posterior teeth have potential to supraerupt if appliance is worn continuously for several months.

When full arch device is fabricated and adjusted supraeruption cannot occur.

#### *Soft or Resilient appliance:*

It is fabricated of resilient material that is usually adapted to maxillary teeth. These have also been recommended for patients who exhibit high levels of clenching and bruxism. When comparing the effectiveness of hard and soft appliances on symptoms showed that although soft appliance can reduce symptoms, hard appliance seem to reduce symptoms more quickly and effectively. [26]

Each of the following possibilities must be considered before any permanent occlusal therapy is attempted

- a) Alteration in occlusal condition  
An occlusal appliance temporarily alter the existing occlusal condition, generally decrease the muscle activity which may result in reduction of symptoms.
- b) Alteration in condylar position  
Most appliances alter condylar position to more structurally compatible and functional position.

- c) Increase in vertical dimension  
All occlusal appliances temporarily increase the vertical dimension. It has been demonstrated that an increase in vertical dimension can temporarily decrease muscle activity. [27]
- d) Cognitive awareness  
Patients who wear occlusal appliances become more aware of their functional and parafunctional behavior. The appliance acts as constant reminder to alter the activity
- e) Increased peripheral input to central nervous system  
Nocturnal muscles activity appears to have its source in the CNS. Any change at the peripheral sensory input seems to have an inhibitory effect on this CNS activity. [28] When an occlusal appliance is placed between the teeth it provides a change in peripheral sensory input thus decreases CNS induced bruxism. The appliance does not cure bruxism it only inhibits the bruxism tendency while it is being worn.

#### ***Pharmacological approaches:***

Drug that affects muscle function by exerting a paralytic effect through an inhibition of acetyl choline release at the neuromuscular junction in botulinum toxin. Tan and Jankovic concluded that this drug can be administered as a safe and effective treatment for sever bruxers. They also stated that this treatment modality should be confined to patients who are refractory to conventional treatments and placebo controlled studies are needed before evidence based recommendations can be given. [29]

#### **CONCLUSION**

Parafunctional habits are potential source for trauma for occlusion. Although no causative association exists between

bruxism and gingival inflammation [30] or periodontitis. [31,32] Bruxism & clenching can cause mobility, wear, fracture of tooth & restorations. Also may lead to periodontal & muscle pain and may contribute to masticatory system disorder. A maxillary or mandibular stabilization appliance is generally considered the most effective mean of managing bruxism. So splint therapy can be used to reduce the trauma from occlusal forces & to improve patients comfort.

Regarding the effect of stress on the development of oral habits, increased stress level in modern societies cause these habits to become more prevalent as compared to the past decades. Since oral habits adversely affect dentoalveolar system, more attention to control and prevent them is required.

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How to cite this article: Moharir AN, Lalitha, Waghmare AS et. al. Bruxism: diagnosis and management. Int J Health Sci Res. 2015; 5(1):297-303.

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