



“CONCEPTS IN DIAGNOSIS AND MANAGEMENT OF BRUXISM” --- A REVIEW

Dental Science

Dr. Dipankar Pal

Associate Professor, Department of Prosthodontics, NBDC&H, Sushrutanagar, W.Bengal, India

ABSTRACT

Bruxism is a movement disorder characterized by grinding and clenching of teeth. Awake bruxism is found more in females as compared to males while sleep bruxism shows no such gender prevalence. Bruxism has a different set of causative factors. The early diagnosis and management can prevent the breakdown of the dentition and pain in the orofacial region. Although various treatment modalities are present, the successful management of bruxism lies in the precise diagnosis and isolation of the etiology. The aim of this revision article is a better understanding of the various concepts in diagnosis and management of bruxism.

KEYWORDS

Bruxism, Sleep bruxism, Awake bruxism, Concepts in bruxism, Management of bruxism

INTRODUCTION:

In simple terms, bruxism is a clenching and grinding of teeth when the individual is not chewing or swallowing. It is noted as the commonest of the many para-functional habits of dento facial system. Bruxism activity is of major concern for the dentists as it leads to tooth wear and damage, restoration fractures, temporal headache and other temporomandibular disorders. The prevalence range is from 8-31% in the general population and 14-20% in children. The people over the age group of 60 years are less likely to be affected showing a prevalence dropping down to around 3%. In most of the cases, bruxism does not cause serious complications, but in severe conditions it can lead to damage of teeth and restorations, tension type headaches, facial or jaw pain and temporomandibular disorders. Hence a proper diagnosis and management of bruxism is of major concern, in order to prevent complications. Bruxism can occur during wakefulness or during sleep. The American Academy of Sleeping Disorders proposed the terms Sleep and Awake Bruxism. Bruxism during daytime is commonly as a semi voluntary activity and is also known as 'Awake Bruxism' (AB) or Diurnal Bruxism (DB). Bruxism during sleep either during daytime or during night is termed as Sleep Bruxism.

History:

The term “bruxomania” is derived from french word “la bruxomanie,” suggested by Marie and Pletkiewicz in 1907. In 1931, Frohman coined the term bruxism. The term bruxism originates from the greek word “brychein”, meaning to grind or gnash the teeth. Miller put forward a differentiation between nocturnal grinding of the teeth which he called as bruxism and the habitual grinding of the teeth in the daytime, which he called as bruxomania. In 1960's, Ramfjord put forward the theory that occlusal factors were responsible for bruxism and he defined bruxism as the habitual habit of grinding teeth when the individual is not chewing or swallowing. In 1983 a distinction was made between clenching and grinding; clenching as centric bruxism and grinding as eccentric bruxism. However, the majority of the researchers now disfavoured that malocclusion to be the main etiological factor and consider it to be multi factorial. In 1995, Vanderas defined bruxism as the non functional movement of the mandible with or without an audible sound occurring during the day or night. And bruxism at night was recently classified as sleep related movement disorder according to recent classification of sleep disorders. In 2001, Lobbezoo and Naeije, stated that various neurotransmitters in the central nervous system appeared to modulate bruxism. According to GPT 9, bruxism is defined as “the parafunctional grinding of the teeth, an oral habit consisting of involuntary rhythmic or spasmodic non-functional gnashing, grinding or clenching of teeth, in other than chewing movements of the mandible, which may lead to occlusal trauma.

Classification of Bruxism: (Table-1)

Primary or idiopathic bruxism	- Peripheral: Occlusal factors - Central: SNc aminergic disorder
Physiological	Usual habit in mixed dentition

Secondary

- Associated with certain medications or other substances: Antidepressant selective serotonin reuptake inhibitors; Inhibitors of calcium channels; Levodopa; - Antidopaminergic Drugs; Antipsychotics, Amphetamines; Substances related to amphetamines; Caffeine, Cocaine, Smoking, Alcohol
- Associated with sleep disorders: Restless leg Syndrome; Periodic limb movement disorder (PLMD); REM Sleep behavior disorder; Obstructive sleep apnea.
- Associated with neurological disorders: - Oromandibular dystonia; - Huntington's disease; - Hemifacial spasm; - Parkinson's disease; - Tardive Dyskinesia post neuroleptic; - Gilles de la Tourette Syndrome; - Multiple System Atrophy; - Olivopontocerebellar atrophy; - Dementia; - Cerebellum hemorrhage; - Myofascial Pain Syndrome- Intellectual disability; - Hyperactivity; - Rett Syndrome; - Coma; - Post Anoxic Encephalopathy
- Associated with psychiatric disorders: - Schizophrenia; Bulimia nervosa.
- Other diseases: - Myofascial Pain, Sjogren Syndrome.

Contraction

- Centric
- Eccentric

Duration

- Acute
- Sub-acute
- Chronic

Etiologic factors of Bruxism: (Table-2)

Morphological factors	Neurophysio pathological factors	Psychological factors	Others
- Occlusal factors - TMJ disorders	- Sleep disorders - Change in dopaminergic neurotransmission - Stress - Drugs consumption - Smoking - Alcohol	- Emotional strain - Stress - Anxiety - Anger	- SNc pathologies - Genetics

Diagnosis (Assessment and accurate interpretation) of Bruxism:

Although bruxism is not a huge handicap, it can influence the quality of human life, especially through dental problems, such as tooth wear leading to inefficiency of mastication, pain in the facial region and

tooth fractures. Hence early identification and preventive measures go a long way to protect the occlusion. Some of the methods of assessment are as follows:

- Questionnaires
- Clinical findings (Signs and Symptoms)
- Intra-oral appliances
- Electro-myographic recording of masticatory muscles

Questionnaires:

Questionnaires are adjuncts in both research and clinical situations. This method can be applied to large population but the limitation is the subjective nature of the response. Most bruxism episodes are not accompanied by noise. So a large percentage of adults and children are unaware of their bruxism activity and thus fails to identify themselves as the bruxers.

QUESTIONNAIRE FOR DETECTING BRUXER (Table-3)

· Has anyone heard you grinding your teeth at night?
· Is your jaw ever fatigue or sore on awakening in the morning?
· Are your teeth or gums ever sore on awakening in the morning?
· Do you ever experience temporal headache on awakening in the morning?
· Are you ever aware of grinding your teeth during the day?
· Are you ever aware of clenching your teeth during the day?

Clinical findings:

The diagnosis of bruxism can be traced out by taking a good case history and evaluating the tooth mobility, tooth wear and other clinical findings of TMJ. Among these, assessment of bruxism event by evaluating tooth wear is controversial as tooth wear is a cumulative record of both functional and parafunctional activities and various factors such as age, gender, diet and bruxism are associated with tooth wear. Guidelines that help to identify bruxism are,

- a) Report of tooth grinding or tapping
- b) Presence of tooth wear seen within normal range of jaw movements or at eccentric position
- c) Presence of masseter muscle hypertrophy on voluntary contraction
- d) Complain of masticatory muscles discomfort, fatigue of stiffness in the morning
- e) Tooth or teeth hypersensitive to cold air or liquid
- f) Clicking or locking of temporomandibular joint

So the evaluation of tooth wear for determining actual bruxism is disputable and hence it is difficult to estimate the degree of contribution of bruxism to tooth wear alone.

Signs and Symptoms:

- Pain in the teeth and sensitivity to heat and cold.
- Chronic muscular facial pain with tension headaches, caused by intense muscle contraction.
- The noise noticed by parents, friends or relatives, that occurs as the teeth are ground together.
- An abnormal alignment of the teeth, caused by uneven tooth wear
- Flattened and worn tooth surfaces, which may reveal the underlying yellow dentine layer.
- Micro fractures of the tooth enamel.
- Broken or chipped teeth
- Loose teeth with possible damage to the tooth sockets
- 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
- Earache

Intra-oral Appliances:

Bruxism activity can be evaluated using intra oral appliances by assessing the wear facets on it and by assessing the bite load on the intra oral appliance. But the accuracy of these methods has not been confirmed. Koriath et al. reported that parafunctional dental activity at night on full-arch occlusal stabilization splints resulted in wear, which was both asymmetric and uneven. The Bruxcore Bruxism Monitoring Device (BBMD) was introduced to measure the nocturnal bruxism activity. 19 Bruxcore plate is used to evaluate the bruxism events by counting the number of abraded microdots on its surface and by scoring the volumetric magnitude of abrasion. The BBMD uses 0.51-mm-thick polyvinyl chloride plate that consists of four layers with two

alternating colors and a halftone dot screen on the topmost surface. The number of missing microdots is counted to evaluate the abraded area and the number of layers uncovered represents the depth parameter. Both of these parameters are combined so as to obtain an index for the amount of bruxism activity. The major disadvantage of this method is that it is difficult to count the number of missing dots with good accuracy. Takeuchi et al. put forward a recording device for sleep bruxism, Intra-splint force detector (ISFD). It uses an intra-oral appliance to measure the force being produced by tooth contact on the appliance. The ISFD detects the force by using a thin, deformation-sensitive piezoelectric film, which is embedded 1–2 mm below the occlusal surface of the appliance. But ISFD was not suitable for detecting the magnitude of force during steady-state clenching behaviour.

Electro-myographic recording:

One among the plethora of assessment tools, the EMG recording has been used to measure actual sleep bruxism activity directly. The main advantage is that the bruxism can be measured without intra-oral devices, which may change natural bruxism activity.

Portable EMG recording devices:

Since the 1970s, sleep bruxism episodes were measured over a period of time in patients' homes with the use of battery-operated EMG recording devices. Criteria for the detection of sleep bruxism with the portable EMG recording system have been suggested but their validity in a large population has not yet been confirmed. The isolation of sleep bruxism is difficult because of other confounding oro-facial activities (e.g. coughing and mumbling). Also; other sleep disorders cannot be ruled out for e.g. micro arousal, tachycardia and sleep-stage shift. The recording the heart rate was suggested as one of the compensatory measures for improving the accuracy of sleep bruxism recognition. A surface EMG electrode with a built-in buffer-amplifier and a cordless type of EMG measurement system was developed as well, to improve the accuracy of recordings.

A miniature self-contained EMG detector-analyser (bite-strip) was developed as a screening test for moderate to high level bruxers, which measured the number of bruxism events by simply attaching it to the skin 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 activities.

Polysomnographic (sleep laboratory) recordings for nocturnal bruxism generally include electroencephalogram, EMG, electrocardiogram and thermally sensitive resistor (monitoring air flow) signals along with simultaneous audio–video recordings. In this the sleep laboratory setting offers a highly controlled recording environment, so other sleep disorders like sleep apnoea and insomnia can be ruled out and sleep bruxism can be differentiated from other orofacial activities like swallowing and coughing that occur during sleep. A change in the environment of sleep can influence the actual behaviour of bruxism, which is considered as a major limitation in polysomnographic recordings.

Management of Bruxism:

Treatment aims to find and remove the causes of bruxism, change the behaviour that causes bruxism and repair the damage that bruxism often causes. The treatment aspect includes;

- Occlusal therapy
- Behavioural modification
- Biofeedback
- Pharmacological therapy

Occlusal therapy:

Occlusal splints have been 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 such as occlusal bite guard, bruxism appliance, bite plate, night guard, occlusal device. They are classified into hard splints and soft splints. Hard splints are preferred over soft splints because soft splints are difficult to adjust than hard splints and hard splints are effective in reducing the bruxism activity. A study compared occlusal splints versus a medication doses gabapentin, and found that both treatments reduced similarly the

muscle activity associated with sleep bruxism after 2 month of therapy.

Behavioural modification:

Psychoanalysis, hypnosis, meditation, sleep, hygiene measures with relaxation techniques and self-monitoring have been considered for the treatment of bruxism. The treatment of sleep bruxism usually begins with counselling of the patient with respect to the sleep hygiene. It includes to instruct the bruxer to stop smoking and drinking of coffee or alcohol at night, to limit the physical or mental activity before going to bed, and to ensure good bedroom conditions like quiet and dark.

Biofeedback:

Biofeedback is based on the principle that bruxers can 'unlearn' their behaviour when a stimulus makes them aware of their adverse jaw muscle activities ('aversive conditioning'). This technique has been applied for bruxism during wakefulness as well as for sleep bruxism. While awake, patients can be trained to control their jaw muscle activities through auditory or visual feedback from a surface EMG. For sleep bruxism, auditory, electrical, vibratory and even taste stimuli can be used for feedback.

Bruxism During Wakefulness/Daytime (AB):

One of the early publications on the use of biofeedback in the management of bruxism during wakefulness was a prescription by Mittelman. He described an EMG technique that provides the daytime clencher with auditory feedback from his/her muscle activity letting him know the degree of muscle activity or relaxation that is taking place. A similar suggestion was given in the review articles by Cannistraci, in which he used a flat occlusal splint for biofeedback. The splint was inserted in the explicit understanding that the appliance serves to remind the daytime bruxer of adverse tooth contacts (i.e. contacts other than those involved in chewing and swallowing) and according to them 50% success was obtained by using this technique.

Sleep Bruxism:

For the use of biofeedback in the management of sleep bruxism, Cherasia and Parks published a prescription. Their technique used contingent arousal from sleep with actual awakenings. Although the authors were aware of the lack of validation of their technique, they stated that its potential effectiveness, ease of use and lack of risk warrant its consideration. Nissani used a taste stimulus to awaken the patient. This stimulus was caused by the bruxism-related rupture of capsules, filled with an aversive substance (agreed upon with the patient) in the dental appliance. On the basis of a single case, the author claimed long-term success. In most of the case reports, a soundblast was applied as the aversive stimulus. The sound stimulus wakes up the patient, who is then supposed to switch off the sound and resume his/her sleep. The awakenings are a major disadvantage of such approaches because sleep disruption may lead to serious side effects like excessive daytime sleepiness. No evidence is available for the long time use of bio-feedback in the management of bruxism. Further, the possible consequences of the frequent arousals, like excessive daytime sleepiness, need further attention before this technique can be applied for the safe treatment of patients with bruxism.

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. In 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 release of acetylcholine at NMJ Shim et al. found that the amplitude of the muscle contraction during bruxism events was reduced after 4 weeks of injection, but with no changes in the rhythm or number of bruxism episodes per hour of sleep.

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. 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. 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.

Research focusing on the relationship between bruxism and prosthetic therapies is scarce. There's no conclusive evidence that any prosthetic therapy can eliminate bruxism and likewise, no evidence to support that bruxism is caused by prosthetic therapy. Several authors and studies have been mentioned while listing the concepts in the diagnosis and management of bruxism. Despite of this, currently no treatment exists that can stop bruxism. Studies require randomised control studies over a larger population before being considered as the norm.

SUMMARY AND CONCLUSION:

Bruxism is a common parafunctional habit occurring both during sleep and wakefulness. Studies show that bruxism is 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 which 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 analyzer have potential if they are scientifically verified in large population and proven to be useful in clinics in terms of easy use. In the absence of definitive evidence, bruxism can be best managed by occlusal appliances, counseling, change in lifestyle and pharmacological interventions.

REFERENCES:

- Manfredini D, Winocur E, Guarda Nardini L, Lobbezoo F. Epidemiology Of Bruxism In Adults: A Systematic Review Of Literature. *Journal of Orofacial Pain*.2013; 27(2): 99-110
- Marie Mm, Pietkiewicz M. La Bruxomanie [Bruxism]. *Revue De Stomatologie*.1907; 14:107-116.
- Frohman BS. Application of Psychotherapy to Dental Problems. *Dent Cosmet*.1931; 73:1117-22.
- Varalakshmi Reddy S, Praveen Kumar M, SravanthiD, Abdul Habeeb Bin Mohsin, Anuhyav.Bruxism: A Literature Review. *Journal of International Oral Health*.2014; 6(6):105-109
- Vandaras AP, Manetas KJ. Relationship between malocclusion and bruxism in children and adolescents: A review. *Pediatr Dent*. 1995; 17:7-12.
- Lobbezoo F, Naeije M. Bruxism is mainly regulated centrally, not peripherally. *J Oral Rehabil*.2001; 28(12):1085-91
- Holmgren K, Sheikholslam A, Riise C. Effect of a fullarch maxillary occlusal splint on parafunctional activity during sleep in patients with nocturnal bruxism and signs and symptoms of craniomandibular disorders. *J Prosthet Dent*.1993; 69:293-297
- Baba K, Clark GT, Watanabe T, Ohyama T. Bruxism force detection by a piezoelectric film-based recording device in sleeping humans. *J Orofac Pain*.2003; 17:58-64.
- Rugh JD, Solberg WK. Electromyographic studies of bruxist behaviour before and during treatment. *J Calif Dent Assoc* 1975 3:56-59
- Yamaguchi T, Mikami S, Okada K. Validity of a newly developed ultraminiature cordless EMG measurement system. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007; 104:e22-e27
- Korioth TW, Bohlig KG, Anderson GC. Digital assessment of occlusal wear patterns on occlusal stabilization splints: a pilot study. *J Prosthet Dent*. 1998; 80: 209-213.
- Forgiome A. Simple but effective method quantifying bruxing behavior. *J Dent Res*. 1974, 53(special issue).
- Takeuchi H, Ikeda T, Clark GT. A piezoelectric film-based intrasplint detection method for bruxism. *J Prosthet Dent*.2001; 86:195-202.
- Jadidi F, Castrillon E, Svensson P. Effect Of Conditioning Electrical Stimuli On Temporalis Electromyographic Activity During Sleep. *J Oral Rehabil*.2007; 34:152-159.
- Lavigne GJ, Khoury S, Abe S, Yamaguchi T, Raphael K. Bruxism physiology and pathology: an overview for clinicians. *J Oral Rehabil*.2008; 35:476-494.
- Oskeson JP. The effects of hard and soft occlusal splints on nocturnal bruxism. *J Am Dent Assoc*.1987; 114:788-791
- Madani AS, Abdollahian E, Khiavi HA, Radvar M, Foroughipour M, Asadpour H et al. The efficacy of gabapentin versus stabilization splint in management of sleep bruxism. *J Prosthodont*. 2013; 22(2):126-31.
- Mittelman J (1976) Biofeedback: new answer to dental pain. It can be administered easily and inexpensively in any dental office. *Dent Manag* 16(21-22):26-27
- Cannistraci AJ (1976) A method to control bruxism: biofeedback assisted relaxation therapy. *J Am Soc Prev Dent* 6:12-15
- Cherasia M, Parks L (1986) Suggestions for use of behavioral measures in treating bruxism. *Psychol Rep* 58:719-722
- Nissani M (2000) Can taste aversion prevent bruxism? *Appl Psychophysiol Biofeedback* 25:43-5467.
- Roehrs T, Carskadon MA, Dement WC, Roth T (2005) Daytime sleepiness and alertness. In: Kryger M, Roth T, Dement WC (eds) *Principles and practice of sleep medicine*. Elsevier Saunders, Philadelphia, pp 39-50
- Watanabe, A., Kanemura, K., Tanabe, N., & Fujisawa, M. Effect of electromyogram biofeedback on daytime clenching behavior in subjects with masticatory muscle pain. *Journal of prosthodontic research*. 2011; 55(2), 75-81.
- Tan, E. K., & Jankovic, J. O. S. E. P. H. Treating severe bruxism with botulinum toxin. *J Am Dent Assoc*. 2000; 131(2), 211-6
- Velly-Miguel AM, Montplaisir J, Rompre PH, Lund JP, Lavigne GL (1992) Bruxism and other orofacial movements during sleep. *J Craniomandib Dis Fac Oral Pain* 6:71-81