

Bruxism : An Obscure Pain

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ABSTRACT

Bruxism is involuntary, excessive grinding, clenching or rubbing of teeth during non-functional movements of the masticatory system. Reported prevalence in children ranges from 7% to 15.1%, 3–5 with girls apparently more frequently affected. Bruxism can occur during the day or night. Generally, patients clench their teeth throughout the day and gnash and clench them during sleep. However, nocturnal bruxism is more frequent; it varies with the individual and has been related to emotional or physical stress. Bruxism usually causes tooth wear as evidenced by wear facets that can range from mild to severe and can be localized or found throughout the dentition. Other trauma to the dentition and supporting tissues include thermal hypersensitivity, hypermobility of tooth, injury to the periodontal ligament and periodontium, hypercementosis, fractured cusps and pulpitis and pulpal necrosis.

KEYWORDS: Bruxism, Diurnal, Habits, Nocturnal

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INTRODUCTION

It was Karolyi, who at the beginning of the twentieth century used the term “traumatic neuralgia”. It refers to the grinding of the teeth. “Bruxism” comes from the Greek expression brychein odontas that means grinding the teeth. In French, bruxomanie was used for the first time by Marie and Pietkiewicz in 1907. Bruxism is unconscious, excessive grinding, rubbing clenching of teeth during non-functional movements of the masticatory system.¹

Sleep bruxism (SB) is a spontaneous mandibular movement with tooth grinding or clenching happening during sleep that can lead to numerous dental, oral complications. Sleep bruxism is a recurrent habit. It is present, at least episodically, in a noteworthy percentage of the population. Nonetheless, the occurrence of SB is not easy to estimate because, in most cases, there is no evident clinical symptoms.^{2,3,4}

Bruxism in pediatric cases has led to some adverse oral conditions. It may be reason for wear in teeth and, in more strict cases, dental traumas. (Glaros & Rao, 1977).

Modern researches have indicated a relation among bruxism and respiratory changes. Other implications for orofacial motricity and words are still not well established.^{5,6} Studies have revealed that the treatment plan for the permanent cure of bruxism has not been established yet. It's the continuous use of pharmacotherapy which benefits the patient.

CLASSIFICATION

Miller suggested differentiating among nocturnal grinding of teeth, which he called bruxism and the regular grinding of the teeth in day time which he called bruxomania. Therefore bruxism can be classified as:

- Day Time Bruxism/ Diurnal bruxism /Bruxomania: conscious or subconscious grinding of teeth usually during the day. It can occur along with parafunctional habits such as chewing pencils, lips, cheeks, nails. This type of bruxism is usually silent except in patients with an organic brain disease.

Bruxism in children has turned out to be a mounting concern in current years due to its downbeat impact on the life value and also for being measured an imperative risk factor for temporomandibular dysfunctions.¹

- Night time bruxism/ Nocturnal bruxism: Subconscious grinding of teeth characterized by rhythmic patterns of masseter EMG activity.

ETIOLOGY OF BRUXISM

Although at first bruxism was considered to originate as a consequence of alterations in dental occlusion, the scientific literature has repeatedly proved that this theory lacks scientific validity. At present studies seem to hold the multi-factorial theory of the origin and pathogenesis of bruxism. It is mainly keeping pace centrally, not peripherally. This fact means that oral habits, temporomandibular disorders (TMD), malocclusions, hypopnoea, high-anxiety levels and stress, among others could manipulate the peripheral happening of bruxism.

Teeth grinding might be manifestations of the incapacity to state emotions such as nervousness, rage, hate, aggression, etc. sometimes indecent interdilatation of teeth may show the way to bruxism.^{4, 7, 8}

High levels of catecholamines have been detected in the urine of children and adults with SB and have been related with anxiety levels. Furthermore, the relationship of dopamine in the basal ganglia has not been proved to be responsible for the control of mouth mobility.^{9, 10, 11, 12}

According to Nadler¹³(1957): various factors result in Bruxism. These are:

- i. Local factors
- ii. Systemic factors
- iii. Psychological factors
- iv. Occupational factors

Describing these factors in brief:

- i) Local factors¹²:
 - Faulty restorations, calculus and periodontitis
 - Traumatic occlusal relationship
 - Functionally incorrect occlusion
 - Malocclusions
 - Dentigerous cyst
 - Faulty eruption of deciduous or permanent teeth
- ii) Systemic factors^{13, 14}:
 - Nutritional and vitamin deficiencies
 - Chronic and parasitic colon diseases,
 - Consistent and recurrent dysfunctions
 - Mouth breathing, asthma
 - Pubertal hormonal changes and hypothyroidism.
 - Intestinal parasite infection
 - Gastrointestinal disturbances from food allergy
 - Enzymatic imbalances in digestion

- Persistent, recurrent urologic dysfunction
- Endocrine disorders, e.g. hyperthyroidism
- Hyperkinetic children.
- Pubertal growth spurt peak in boys
- Hereditary factors are important to genesis and pattern of Bruxism
- Allergy
- CNS disturbances: e.g. cortical brain lesions
- Nadler¹³ believed that histamine released during stress.

iii) Psychological factors¹⁴: It is the most dominant factor. Nervous tension finds a most gratifying release in clenching and bruxism.

iv) Occupational factors: Athletes, indulge in bruxism because of a great desire to excel. Over anxious students/compulsive over achievers

The pathophysiology of sleep bruxism is described in Table No.1 given by Kato et al.

Table No.1

Exogenous/Peripheral Factors	Endogenous
<ul style="list-style-type: none"> •Stress-anxiety •Environmental influences (e.g., familial jaw-clenching reactions, tongue habits) •Occlusal interferences •Medication (e.g., L-dopa, neuroleptics, amphetamine) •Substance abuse (e.g., cocaine, alcohol) 	<ul style="list-style-type: none"> •Personality (e.g., anxious) •Genetic (no proven transmission) •Neurochemicals (e.g., dopamine, serotonin, noradrenaline) •Neurological disorders (e.g., Parkinson, Meige syndrome/oral tardive dyskinesia, cerebellar haemorrhage) •Psychiatric-related disorders (e.g., dementia, tics/Tourette's syndrome) •Sleep disorders (e.g., apnea)

CLINICAL FEATURES

There are various clinical features related to Bruxism. These are described as under:

On Teeth(Figure No.1):^{15, 16, 17, 18}

- Occlusal or incisal attrition that do not conform to or coincide with normal masticatory or swallowing wear patterns.
- Such wear facets are seen at the incisal tip of maxillary cuspids. Dull percussion sounds.
- Wear patterns of long standing bruxism is often very uneven and usually more severe on anterior than on posterior teeth in natural dentition. Natural tooth wear is estimated at around 65 micrometers vertical loss per year.
- Faceting of the tooth surface loss (NCTSL) can be an important sign and should be investigated.



FIGURE NO.1 Facets on Teeth

Effects on muscles(Figure No.2):^{15, 16, 17, 18}

- Increased tonus and hypertrophy of masticatory muscles
- Soreness of masticatory muscles
- Masticatory muscles are tender to palpation
- Increased sensitivity from excessive abrasion of enamel.

- Tender spots are more common along the anterior and lower border of the masseter and medial pterygoid muscles.
- Sometimes headaches of the type usually called tension or emotional are associated.
- Muscular facial pain, Muscle tiredness or tightness and fatigue on rising in morning.

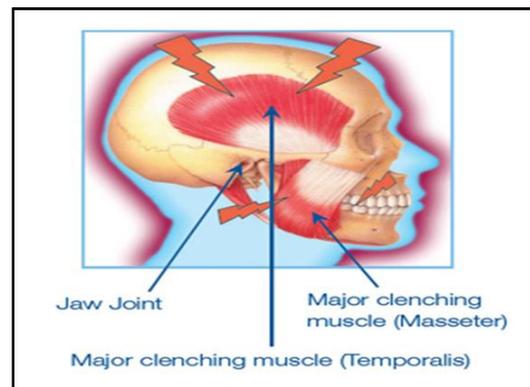


FIGURE NO.2 Mechanism of Clenching

Effects on TMJ:^{15, 16, 17, 18}

- TMJ discomfort and pain.
- The disc may become worn or perforated and wear patterns are often correlated with condylar remodelling.
- Nocturnal Bruxism is considered an important etiological factor in several muscular and TMJ conditions like:
 - Locking of jaws
 - Maxillary and mandibular exostoses
 - Audible occlusal sounds of non-functional grinding.

Other features:^{15, 16, 17}

- Decreased facial vertical dimension and mandibular over closing.
- Sensitive teeth (hypersensitivity) often indicates active erosion in bruxism
- Fractured tooth cusps, pulpitis, and pulpal necrosis

DIAGNOSIS OF NOCTURNAL BRUXISM

History and clinical examination is usually sufficient to diagnose bruxism. The consistent method of examination is:^{16, 17, 19}

- Clinical examination.
- Most studies that measure the dental wear in bruxist subjects base their diagnosis of bruxism on a visual examination of dental wear without making clear differentiation between physiological or pathological wear with reliable tools, such as digital systems.
- Waltimo et al. found that the most common dental facets are the ones with horizontal form that indicate a grinding pattern rather than a clenching pattern of bruxism.
- Negoro and Briggs reported differences between the dental wear of bruxist and non-bruxist subjects using the visual examination of the dental wear.
- For image analysis, different parameters such as the evaluation of the area, perimeter, factor of the form (D factor), and fractal dimension have been used for different tasks.
- The fractal dimension describes complex forms and structural patterns in the images and allows a characterization of properties as roughness. It is accepted that a higher fractal dimension corresponds to a more complex form.
- Kydd and Daly (1985) suggest that a diagnosis of bruxism is not dependant on the presence or absence of the habit.
- Electromyography Recording (EMG) can assess the activity of the masseter muscle, showing an increase during bruxing. (Clarke & Reynolds 1991).
- Grinding may be diagnosed with a degree of certainty when there are reports from people

sharing living space that an audible grinding takes place when the subject is sleeping.

Occlusal analysis:

To detect any prematurity. Use of temporary bite planes or occlusal splints to achieve muscle relaxation and to diagnose the occlusal trigger factors of bruxism. The bruxcore plate is occasionally used for diagnosis in research; however it may not be entirely reliable. (Pierce and Gale 1989)

Provocation Test:

Ask the patient to move the mandible in lateral and/ or protrusive positions until wear facets on mandibular and maxillary arches correspond. Then ask the patient to purposely clench/ grind the maxillary teeth until symptoms, similar to patients complaints are noted.^{15, 16, 17, 19}

TREATMENT OF BRUXISM

It can be divided broadly into four types¹⁷: -
Psychologic, Pharmacologic, Physical, Surgical

Psychologic:

Stress reduction / management

- Deep breathing exercise, relaxing exercise and physiotherapy
- Treat underlying dental disease

Bio-feedback:

During a biofeedback session, a therapist applies electrical sensors to different parts of the body. These sensors monitor body's physiological responses to stress — such as teeth grinding — and then feed the information back via auditory and visual cues. These cues may take the form of a beeping sound or a flashing light. With this feedback, patients start to associate teeth grinding or clenching with stress and learn to change behaviour.^{17,18,19}

Psychotherapy:

Psychoanalysis should be carried out and appropriate treatment should be given by a clinical psychologist.¹⁹

Hypnosis:

- Hypnosis is a beneficial adjunct in the treatment of bruxism. (Gastone L 1983)
- There are several interesting case reports of hypnosis in the treatment of bruxism; however, there is a distinct lack of scientific research on the topic.
- Acupressure for relaxation.¹⁹

Pharmacotherapy for Bruxism (for short term use only) :^{19, 20, 21}

- Benzodiazepines: Clonazepam, Diazepam
- Trazodone, a widely prescribed and effective medication for insomnia.
- Clonazepam therapy significantly improved bruxism.
- B - Adrenergic blocker: Propranolol (did not affect sleep bruxism)
- Selective $\alpha[2]$ -agonist(clonidine) decreased sympathetic tone in the minute preceding the onset of sleep bruxism.
- Botulinum Toxin-A (BTX-A): it is used In very refractory cases of decreased Masseter Muscle Hypertrophy²²
- Carbamazepine (e.g. Tegretol) has an effect in the Central Nervous System and is occasionally used in severe cases of bruxism.
- Calcium and pantothenic acid may be helpful as they are often used in treating involuntary muscle movement.

Appliance therapy (physical & surgical):^{23,24, 25,26}**Occlusive appliances / splints / protectors**

- Customized / pre - fabricated, many varieties
- A temporary effect: Protect teeth but do not stop bruxism
- Anterior bite plane, posterior bite plane(Figure No.3 & Figure No.4)

Purpose of bite plane and splints^{27, 28}

- To stop bruxism by elimination of occlusal interferences.
- To let the patient grind the teeth against acrylic or two occlusal splints and thereby avoid occlusal wear.

Requirements of bite plane

- Eliminate occlusal interferences with minimal amount of bite opening.
- Maintain a stable position of the teeth while the appliance is in use.

**FIGURE NO.3****Anterior Bite plane****FIGURE NO.4****Posterior Bite plane****Soft and Hard Acrylic Guard :**

- Used for long term treatment
- Resists wear and tear
- Ellison and Stanziani (1993) state that “no entirely satisfactory treatment has been identified” in managing bruxism.
- Restoration of lost vertical dimensions- cast crowns/ stainless steel crowns.^{29, 30}

DISCUSSION

Blount RL³¹ finds out that several diurnal audible teeth grinding (bruxism) was found to affect 21.5% of population. Their study is in contradiction with Antonio et al³² according to them the prevalence of bruxism in children is estimated to range from 7% to 15.1%. Christer hublin³³ et al reported a case on "Sleep bruxism based on self-report in a nationwide twin cohort" he concluded that females compared to males reported more childhood bruxism. There are substantial genetic effects on bruxism both in childhood and adults. The aim of the study was to evaluate and compare the area, perimeter, and form of the dental wear among bruxist and non-bruxist children with mixed dentition in order to determine if the dental wear may be used as criteria to diagnose bruxism. It was found that the two groups had statistically significant difference with greater perimeter, area, and irregular manner of pathological wear among the bruxist group. They concluded that digital imaging of dental wear may be used as criteria to diagnose bruxism in children with mixed dentition.

Most authors suggest bruxism to have a multifactorial etiology. Basically, two groups of etiological factors can be distinguished, peripheral & morphological factors and central (pathophysiological and psychological) factors. Among the emotional features, anxiety has been the factor most often studied in children.

Dental wear can be caused by digestive problems and physiological masticatory functions. Dental wear of natural teeth depends on variables such as structure and hardness of the dental enamel; charge applied to the contact surfaces, saliva, and duration of the contact.³⁴ The first half of this note describes a latest biofeedback methodology for bruxism

treatment. A less unpleasant liquid is first put in small sealed polythene capsules. The two capsules are held to a novel; specifically constructed which perfectly places them in between the upper and lower teeth. The appliance with capsules are used at night or during those times when one suspects more chance of bruxism. Whenever the user tries to brux, the capsules rupture and the liquid gets released into the users mouth. This liquid draws patient's attention to prevent any unconscious effort of teeth clenchin. The second half of the note informs us the successful long-term application of this new treatment modality to one chronic bruxer.³⁵

In another study a multiple baseline across subjects design was used to assess the effectiveness of contingent "icing," brief contingent applications of ice, for the treatment of bruxism. Three 15-minute treatment periods and two 5-minute generalization periods were conducted 5 days per week. One resident displayed a 95 % reduction in the percentage of intervals during which bruxism occurred during treatment periods and a 67 % reduction during generalization periods. The other resident displayed a 94% reduction in the percentage of intervals during which bruxism occurred during treatment periods and a 53 % reduction during generalization periods.³⁶

The aim of a similar study conducted by P M Castelo et al² was to evaluate the relationship between nutritive and Para functional habit and the presence of temporomandibular dysfunction in children with primary dentition. Ninety nine children with an age between 3-5 years were checked for any presence or absence of signs and symptoms of TMD, oral parafunctions and nutritive habits by conduct of proper interviews and clinical examination. The results were then submitted to descriptive statistical analysis and Fisher's exact test. The results showed that

only atypical swallowing was positively related to TMD ($P < 00001$); other oral parafunctional and nutritive habits were not related to TMD. It was concluded that the Para functional habits, with an exception of atypical swallowing were not the determinants for any presence of signs and/ or symptoms of TMD in the children used in the study.³⁶

CONCLUSION

Sleep bruxism is a parafunctional oromotor habit with a high prevalence in the general population. Because of its clinical importance, it has been the latest point of focus in dentistry. Literatures depict of various hypothesis laid to describe the etiopathogenesis and physiopathology of Bruxism. At present a multi-factor etiological model is accepted that includes genetic, neurophysiological, psycho-emotional and pharmacological factors. In contrast to the general belief, only few cases of bruxers develop a pathological picture as a result of this adverse oral habit. This usually happens in those cases, where the Bruxism exceeds the body's capacity to adapt, which may sometime lead to craniomandibular dysfunction. As because there is no definite treatment to get rid of the habit permanently, therapeutic approach is considered the best line of treatment which would prevent damage and rather help in treating the various pathological adverse effects of bruxism.

REFERENCES

1. Antonio AG, Pierro VS, Maia LC. Bruxism in Children: A Warning Sign for Psychological Problems. *J Can Dent Assoc* 2006; 72(2):155–160.
2. Castelo PM, Barbosa TS, Gaviao MB. Quality of life evaluation of children with sleep bruxism. *BMC Oral Health* 2010;10(16):1-7
3. Lavigne GJ, Kato T, Kolta A, Sessle BJ. Neurobiological mechanisms Involved In Sleep Bruxism. *Crit Rev Oral Biol Med* 2003;14(1):30-46
4. Aizpurua JL, Alonso DE, Arbizu TR, Jiménez MJ. Sleep bruxism. Conceptual review and update. *Med Oral Patol Oral Cir Bucal* 2011;16 (2):231-238.
5. Zenari MS, Bitar ML. Factors associated to bruxism in children from 4 - 6 years. *Pró-Fono R. Atual Cient* 2010;22(4):465-472
6. Barnoy EL, Najdowski ACi, Tarbox J, Wilke AE, Nollet MD. Evaluation Of A Multicomponent Intervention For Diurnal Bruxism In A Young Child With Autism. *J Appl Behav Anal* 2009;42(4):845–848
7. Clinical Pedodontics by Finn. Oral habits in children by Joseph M. Sim and Sidney B. Finn, ch. 17; 4th edition; page no.370-385.
8. Textbook of Pedodontics by Shobha Tandon. 2nd edition; Chapter 39: Commonly Occurring Oral Habits In Children And Their Management. Pg no. 492-526
9. Velez AL, Restrepo CC, Vargas AP, Gallego GJ, Alvarez E, Tamayo V, Tamayo M; Head posture and dental wear evaluation of bruxist children with

- primary teeth; *Journal of Oral Rehabilitation*. 2007;34:663–670
10. Miamoto CB, Pereira LJ, Jorge ML, Marques LS. Prevalence and predictive factors of sleep bruxism in children with and without cognitive impairment. *Braz Oral Res*. 2011;25(5):439-445
 11. Seraj B, Shahrabi M, Ghadimi S, Ahmadi R, Nikfarjam J, Zayeri F, Taghi F, Zareh H. The Prevalence of Bruxism and Correlated Factors in Children Referred to Dental Schools of Tehran, Based on Parents' Report. *Iranian Journal of Pediatrics*. 2010;20(2):174-180
 12. Perlman AE, Eli I, Rubin PF, Goldsmith C, Reiter S, Winocur E. Bruxism, oral parafunctions, anamnestic and clinical findings of temporomandibular disorders in children. *Journal of Oral Rehabilitation*. 2012;39:126–135
 13. Marbach JJ, Raphael KG, Janal MN, Roth RH. Reliability of clinician judgements of bruxism. *Journal of Oral Rehabilitation*. 2003;30:113–118
 14. Katayoun E, Sima F, Naser V, Anahita D. Study of the relationship of psychosocial disorders to bruxism in adolescents. *J Indian Soc Pedod Prev Dent*. 2008;26:91-97
 15. Ciancaglini R, Gherlone EF, Radaelli G. The relationship of bruxism with craniofacial pain and symptoms from the masticatory system in the adult population. *Journal of Oral Rehabilitation*. 2001;28:842-848
 16. Restrepo C, Pelaez A, Alvarez E, Paucar C, Abad P. Digital imaging of patterns of dental wear to diagnose bruxism in children. *International Journal of Paediatric Dentistry*. 2006;16:278–285
 17. Goncalves LPV, Toledo OA, Bezerra AC, Leal SC. Variables associated with Bruxism in children and adolescents. *ConScientiae Saude*. 2009;8(3):397-403
 18. Herrera M, Valencia I, Grant M, Metroka D, Chialastri A, Kothare SV. Bruxism in Children: Effect on Sleep Architecture and Daytime Cognitive Performance and Behavior. *SLEEP*. 2006;29(9):1143-1148
 19. Restrepo C, Gomez S, Manrique R. Treatment of bruxism in children: A Systematic Review. *Quintessence International*. 2009;40(10):849-855
 20. Nissani M. A Taste-Based Approach to the Prevention of Bruxism. *Applied Psychophysiology and Biofeedback*. 2000;24(1):43-54
 21. Saletu A, Parapatics S, Saletu B, Anderer P, Prause W, Putz H, Adelbauer J, Zyhlarz GM. On the Pharmacotherapy of Sleep Bruxism: Placebo-Controlled Polysomnographic and Psychometric Studies with Clonazepam. *Neuropsychobiology*. 2005;51:214–225
 22. Bresolin D, Shapiro PA, Shapiro GG, Chapko MK, Dassel S. Mouth breathing in allergic children: its relationship to dentofacial development. *Am J Orthod*. 1983;83(4):334-340.
 23. Graber TM, Rakosi T, Petrovic AG. 1985 Dentofacial orthopedics with functional appliances; page no. 496-519.
 24. Moyers : Textbook of orthodontics ;etiology of malocclusion: general factors ; ch-6 , pages 301- 330
 25. Ankita Jain, Dara John Bhaskar, Dev Anand Gupta. Adverse Oral Habits: Potential harm to dentition. Lap Lambert Academic Publishing, 2013.
 26. Contemporary Orthodontics by William R. Proffit; 4th edition; Ch-12: Treatment of Nonskeletal Problems In Preadolescent Children; Pg no. : 443-449

27. Malki GA, Zawawi KH, Melis M, Hughes CV. Prevalence of bruxism in children receiving treatment for attention deficit hyperactivity disorder: a pilot study. *The Journal of Clinical Pediatric Dentistry*. 2004;29(1):63-68
28. Shakibaei F, Gholamrezaei A, Heidari S. Effect of trazodone on sleep bruxism in children and adolescents 6-18 years of age, a pilot study. *Journal of Research in Medical Sciences*. 2008;13(1):29-33
29. *Pediatric Dentistry – Infancy through adolescence* by Pinkham; oral habits by John R. Christensen, Henry W. Fields Jr., and Steven M. Adair, ch.26; edition 4; page no. 431-439.
30. Almonaitienė A, Balčiūnienė I, Tutkuvienė J. Prevalence of oral habits and their impact on facial parameters in lithuanian children 4 to 9 years of age. *Medicinos*. 2013; 19(1):31-38.
31. Blount RL, Drabman RS, Wilson N, Stewart D. reducing severe diurnal bruxism in two profoundly retarded females. *Journal of applied behavior analysis*. 1982;15(4):565-571.
32. *Bruxism Theory and Practice* by Daniel A. Paesani. Ch. No. 1, Introduction to Bruxism, pg. no. 3, 22, 23
33. Patrick M, John M. Cranio-facial changes and mouth breathing. *Irish Dental Journal* 2011.
34. Motta LJ, Bachiega JC, Guedes CC, Laranja LT, Bussadori SK. Association between halitosis and mouth breathing in children. *Clinics (Sao Paulo)* 2011;66(6):939-942.
35. Limme M. Orthognathic and orthodontic consequences of mouth breathing. *Acta Otorhinolaryngol Belg* 1993;47(2):145-155
36. Adams CP, Kerr WS. The design, construction and use of removable orthodontic appliances.