ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14936411

# Current Perspectives on Bruxism: From Etiology to Strategical Management

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Publication Date: 2025/02/27

**Abstract: Oral parafunctional habits, such as bruxism, nail-biting, and thumb sucking, represent repetitive behaviors that significantly impact oral and overall health. These habits, characterized by abnormal muscle activity, can lead to complications including malocclusion, temporomandibular joint disorders, and tooth damage. The prevalence of these habits is particularly notable in children, with thumb sucking affecting nearly 50% of the young population. While some habits resolve naturally, others persist and cause irreversible dental and structural issues. Etiological factors are multifactorial, encompassing psychological stress, developmental needs, and environmental influences. Effective management requires early detection and a multidisciplinary approach, incorporating behavioral therapies, orthodontic interventions, and psychosocial support. This review highlights the classification, consequences, and therapeutic strategies for parafunctional habits, emphasizing the need for awareness and early intervention to promote optimal oral health and well-being.**

**Further research is essential to deepen our understanding of parafunctional habits and their multifaceted effects on oral and overall health. Current treatment approaches, while effective for many patients, often focus on mitigating symptoms rather than addressing the underlying causes or preventing recurrence. This underscores the need for innovative and personalized treatment plans**

***Keywords:*** *Parafunctional Habits, Splints, Prosthodontics, TMJ*

**How to Cite:** Dr. Poojita Babu Shetty; Dr. Bharath Prabhu; Dr. Vidya K Shenoy; Dr. Miranda Glynis Anitha (2025) Current Perspectives on Bruxism: From Etiology to Strategical Management. *International Journal of Innovative Science and Research Technology*, 10(2), 780-785. https://doi.org/10.5281/zenodo.14936411

## I. INTRODUCTION

Oral health is an important part of general health as well as well-being. Over the past two decades, traditional methods of measuring oral health, which mainly focus on the absence or presence of oral diseases have been substituted by a multidimensional concept that includes the psychosocial aspects of oral health and their influence on quality of life. Deleterious oral habits are the common problem of pediatricians which affects the quality of life. Oral habits are repetitive behavior in the oral cavity that result in loss of tooth structure and they include digit sucking, pacifier sucking, lip sucking and biting, nail-biting, bruxism, self injurious habits, mouth breathing and tongue thrusting. Their effect is dependent on the nature, onset and duration of habits. (1)

## II. ORIGIN

Parafunctional habits like bruxism, nail-biting, lip and tongue thrusting, and mouth breathing significantly impact children's oral health. These behaviors involve complex, learned muscle patterns that can harm teeth, the jaw, muscles, and the temporomandibular joint. Thumb sucking, one of the most prevalent habits, affects nearly half of children worldwide. Though initially harmless, prolonged thumb sucking beyond six years can cause malocclusion, decreased maxillary arch width, increased overjet, and anterior open bite, leading to irreversible dental and jaw damage. Similarly, bruxism, characterized by rhythmic masticatory muscle contractions during sleep, increases the risk of occlusal problems and temporomandibular joint disorders. It also contributes to facial pain, muscular hypertrophy, and disrupted sleep patterns, underscoring the need for early intervention.(2)

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14936411

Parafunctional habits like bruxism exert destructive horizontal forces on dental structures, surpassing those of normal chewing. Early identification and classification of these habits are critical for effective management and prevention of complications. Interventions such as behavioral therapy and orthodontic treatments can mitigate their negative impact on children's oral health and overall well-being. Raising awareness of the prevalence and consequences of these habits is essential to promote early intervention and ensure better oral health outcomes for children.(3)

Psychic-emotional factors such as depression and anxiety are known to influence an individual's perception and tolerance of physical symptoms and stress-triggering situations. In today's society, characterized by a constant state of alertness, it is crucial for professionals to understand the etiology, consequences, and implications of oral parafunctional mechanisms on the human body. This awareness is particularly important for individuals undergoing orthodontic treatment. (4,5)

## III. BRUXISM

The term 'la bruxomanie' was first introduced by Marie Pietkiewicz in 1907. It was latter adopted as bruxism 'to describe gnashing and grinding of the teeth occurring without a functional purpose. Glossary of Prosthodontic Terms (GPT-8) defines bruxism as parafunctional grinding of teeth or an oral habit consisting of involuntary rhythmic or spasmodic nonfunctional gnashing, grinding or clenching of teeth in other than chewing movements of the mandible which may lead to occlusal trauma. Bruxism is a condition characterized by the involuntary or habitual grinding of teeth and clenching of the jaw. It can occur during the day (awake bruxism) or at night (sleep bruxism). Bruxism can lead to various dental and health issues if not managed properly.(6)

Functional activities are controllable and occurred daily. Parafunctional actions may be consciously or unconsciously and are normally without sound. However, bruxism in nights is unconsciously and mostly it is with sound production (Okeson, 1998). Sleep bruxism in the adult occurs during stages first and second of non-rapid eye movement (REM) sleep and REM sleep. These people do not have any complaint about bruxism, and it would not affect their quality of sleep. But in the old and people with sleep apnea, bruxism can reduce the quality of sleep (Kato et al., 2001).

Sleep bruxism has 2 types: Primary or idiopathic and secondary or iatrogenic. The first type is without any medical reason and the secondary type is whether with use of drug or without the use of drug. Bruxism is a significant topic in dentistry and medical fields, with increased citations and congresses. However, more clinical research is needed to understand its context. The definition of bruxism has shifted from pathology to motor activity, potentially affecting physiological or protective aspects. The dental profession should include recent changes in the definition in the Glossary of Prosthodontic Terms to align with sleep and orofacial pain medicine terminology (7)

Bruxism is now recognized as a broad term encompassing various motor activities, including isometric, clenching-type behaviors. This shift acknowledges that focusing solely on sleep bruxism (SB) events identified through arousal-based criteria, like those used in polysomnography (PSG), has limitations for clinical purposes. Critics argue that this approach overlooks important aspects of bruxism.The need for a more comprehensive taxonomy is clear, particularly given the poor quality of research on bruxism management, which often fails to provide practical treatment guidelines. It's also important to understand that in healthy individuals, bruxism isn't necessarily a disorder — it can function as either a risk factor or even a protective behavior.To assess bruxism, both non-instrumental methods (like self-reports) and instrumental methods (like electromyography) can be used. However, applying strict cutoff points for bruxism detection isn't suitable for otherwise healthy individuals. Instead, clinicians should evaluate bruxism-related muscle activity along a continuum to better understand its clinical implications.

## IV. IMPLICATIONS FOR THE PROSTHODONTIST

The evolving understanding of bruxism presents important considerations for prosthodontists. The current definition in the latest *Glossary of Prosthodontic Terms* describes bruxism as a "parafunctional grinding of teeth," involving "involuntary rhythmic or spasmodic nonfunctional gnashing, grinding, or clenching of teeth, outside of normal chewing movements." While this definition covers key aspects, it is limited by ambiguous terms like *rhythmic*, *spasmodic*, and *gnashing*, which can be open to interpretation.

Additionally, the definition overlooks the well-accepted circadian nature of bruxism, such as distinguishing between sleep and awake bruxism. It also fails to account for masticatory muscle activities like bracing or thrusting of the mandible. These behaviors are similar to tooth contact but do not actually involve the teeth touching, yet they can still have significant clinical implications. Understanding and addressing these subtleties are essential for comprehensive prosthodontic care. (27)

One of the key issues is the use of vague terms such as *rhythmic*, *spasmodic*, and *gnashing*, which lack clear clinical or diagnostic criteria. This ambiguity can lead to inconsistent diagnosis and management approaches. Furthermore, the definition focuses exclusively on tooth contact, overlooking other types of parafunctional activities involving the masticatory muscles. These include behaviors such as bracing (maintaining constant muscle tension without tooth contact)

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14936411

and thrusting of the mandible. Although these actions do not involve teeth touching, they can contribute to muscular fatigue, temporomandibular joint (TMJ) issues, and other complications relevant to prosthodontic care.

Another significant oversight is the failure to account for the circadian nature of bruxism, which can manifest differently during sleep and wakefulness. Sleep bruxism (SB) is often associated with arousal events during the sleep cycle and tends to be rhythmic in nature, while awake bruxism (AB) typically involves sustained clenching or bracing patterns and is often linked to stress or concentration. The lack of differentiation between these types in the traditional definition limits the prosthodontist's ability to tailor treatment strategies effectively.

From a clinical standpoint, understanding these nuances is critical for the design, fabrication, and long-term success of prosthetic restorations. Excessive masticatory muscle activity can lead to accelerated wear of dental restorations, fractures, implant failures, and complications with occlusal stability. By recognizing and addressing the full spectrum of bruxism-related behaviors, prosthodontists can better predict and manage these risks.

The evolving bruxism construct also emphasizes the need for a more comprehensive assessment approach. Beyond traditional self-reports and clinical observations, instrumental methods such as electromyography (EMG) can provide valuable insights into masticatory muscle activity patterns. This data can help prosthodontists design prosthetic solutions that accommodate the patient's unique parafunctional tendencies, potentially improving both function and comfort.

## V. TYPES OF BRUXISM

Bruxism can occur either during wakefulness or sleep, with distinct characteristics for each type.

**Awake Bruxism (AB)**, also known as *Diurnal Bruxism (DB)*, typically involves semi-voluntary clenching activities during the day. It is often linked to stress from family responsibilities or work pressures and is more commonly observed in women.

On the other hand, **Sleep Bruxism (SB)** occurs during sleep, whether at night or during daytime naps. It is characterized by tooth grinding and/or clenching and is classified as a sleep-related movement disorder according to modern sleep disorder classifications. Sleep bruxism may be associated with arousals during sleep or other sleep conditions such as sleep apnea. Interestingly, while AB is more prevalent among females, there is no significant gender difference in the occurrence of SB.

The prevalence of AB in the adult population is about 20%, while SB affects around 8% to 16%. SB can start as early as one year of age following the eruption of deciduous teeth and is more commonly seen in children, with prevalence rates ranging from 14% to 20%. However, it decreases significantly in adults over 60, where only about 3% report frequent grinding.

❖ *Causes of Bruxism*

The causes of bruxism are complex and multifactorial, involving a combination of physical, psychological, and genetic factors.

➢ *Stress and Anxiety:*

High levels of stress and anxiety are major triggers for bruxism, particularly during sleep. Emotional tension often manifests as involuntary clenching or grinding.

➢ *Sleep Disorders:*

Conditions such as sleep apnea increase the likelihood of bruxism. Frequent arousals or disruptions in sleep patterns may contribute to this behavior.

➢ *Malocclusion:*

Misaligned teeth or an abnormal bite can lead to bruxism by altering the natural dynamics of the jaw during rest and function.

➢ *Lifestyle Factors:*

Smoking, alcohol consumption, caffeine intake, and the use of recreational drugs have been linked to a higher risk of bruxism. These substances can affect the nervous system and increase muscle activity.

➢ *Medications:*

Certain medications, particularly those used for treating depression and other psychiatric conditions, have been associated with bruxism as a side effect. Understanding these diverse causes is essential for tailored treatment approaches, emphasizing the need to address both behavioral and physical factors for effective bruxism management.

## VI. SYMPTOMS AND COMPLICATIONS AND DIAGNOSIS OF BRUXISM

Bruxism is a complex condition with varying symptoms and potential complications, often requiring nuanced diagnostic strategies to assess its impact and associated risks accurately.

➢ *Intraoral Appliance Wear*

According to Holmgren et al. (1987), full-arch acrylic resin splints exhibit repetitive wear patterns, with wear facets reoccurring in the same spots following adjustments. Korioth et al. (1989) noted that nocturnal parafunctional activity

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14936411

caused full-arch occlusal splints to wear unevenly and asymmetrically.

The Bruxcore Bruxism-Monitoring Device (BBMD) counts abraded microdots and evaluates abrasion depth to measure bruxism. It is a 0.51-mm thick polyvinyl chloride plate with four layers and a halftone dot screen. However, accuracy is impacted by inconsistent press-forming and challenges with counting a large number of missing dots. When measuring abrasion, Isaacsson et al. (1988) discovered significant interobserver variation. In contrast, a more recent computer-based approach demonstrated high inter-rater reliability (ICC = 0.99), correctly identifying 97.4% of bruxers and 66.7% of controls. Pierce and Gale (1991) questioned the pBite Force Detection method after finding no discernible relationship between Bruxcore plate scores and EMG-recorded bruxism.

Using piezoelectric film, Takeuchi et al. (1994) created an intra-splint force detector (ISFD) to measure the force between the teeth and the splint during sleep bruxism. Despite its limitations in identifying persistent clenching forces, ISFD demonstrated a strong correlation.

- *Masticatory Muscle EMG Recording*

EMG recording offers an objective assessment of bruxism activity without intraoral devices, though device use may alter natural bruxism. Portable EMG systems, developed in the 1970s, enable multi-night recordings at home with minimal cost, though early versions provided only cumulative data. Modern portable EMG devices measure the number, duration, and intensity of bruxism events, though their validity in large populations remains unconfirmed. Limitations include interference from other orofacial activities and the need for additional measures like heart rate monitoring for accuracy.

- *Miniature self-Contained EMG Devices*

BiteStrip, a compact EMG detector, offers cost-effective bruxism screening by attaching to the skin over the masseter muscle. Grindcare, with biofeedback functions, records and reduces bruxism activity through real-time stimulation, though large-scale validation is needed. Portable EMG devices provide detailed bruxism data but are influenced by electrode placement and environmental factors.

- *Polysomnography*

Polysomnography, the gold standard, records multiple physiological signals, ruling out other sleep disorders and providing reliable data. However, high costs and altered sleep environments limit its routine use despite its accuracy.(8)

- *Understanding Bruxism Variability*

A key challenge in bruxism research is capturing night-to-night and day-to-day variability. Effective measurement strategies, including methods like polysomnography (PSG) for sleep bruxism (SB) and electromyography (EMG) for monitoring masticatory muscle activity (MMA), are essential for correlating bruxism with oral health outcomes. However, there is a lack of evidence-based guidance on how factors such as sleep apnea (OSA), gastroesophageal reflux disease (GERD), or medications influence the frequency and severity of bruxism.

- *Clinical Consequences*

Studies indicate that individuals with noticeable tooth wear often have higher Single-Body Muscle Index (SB index) scores. Yet, single-channel EMG readings do not consistently differentiate between those with and without tooth wear. Furthermore, no clear relationship has been established between SB index scores and temporomandibular joint (TMJ) or jaw muscle pain.

The pain-adaptation model suggests that prolonged clenching may cause muscle fatigue and pain, although an alternative hypothesis posits that muscle fiber exhaustion could trigger protective adaptations, reducing EMG activity after pain begins. This complex dynamic underscores the need for alternative approaches to identify SB individuals at a higher risk of pain, such as cluster analyses and increased background EMG activity assessments.

A biological model is essential for understanding how factors like oral pH levels and muscle force vectors impact bruxism outcomes. For instance, a poorly lubricated low-pH oral environment can accelerate enamel wear, while unfavorable muscle force vectors may predispose hyperdivergent individuals to TMJ disorders.

- *Associated Conditions*

Limited data support a high SB index (more than 13 episodes per hour) in individuals with OSA and confirmed SB. Preliminary evidence also suggests that bruxers may experience higher rates of periodic limb movement during sleep (PLMS) than healthy controls. However, further research is needed to explore how additional conditions and risk factors contribute to bruxism severity.((9,10)

- *Dental Damage:*

Wear and tear on teeth, chipped or fractured teeth, and damage to dental restorations. Jaw Pain: Pain or discomfort in the jaw muscles, temporomandibular joint (TMJ), and surrounding areas. Headaches: Frequent headaches, particularly tension-type headaches. Ear Pain: Earaches or a feeling of fullness in the ears. Sleep Disruption: Disturbed sleep patterns, both for the person with bruxism and their bed partner.

- *Management of Bruxism*

Managing bruxism requires a comprehensive approach that addresses the underlying causes, prevents damage, and promotes healthier habits. Effective strategies range from

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stress management to the use of dental appliances and behavioral interventions.

One of the primary contributors to bruxism is stress. Techniques such as relaxation exercises, meditation, and counseling can help reduce anxiety and, in turn, lessen clenching and grinding behaviors. Cognitive-behavioral therapy (CBT) has also been found effective in helping patients better manage stress-related bruxism. Dental appliances like mouthguards and splints are frequently used to protect teeth from grinding and reduce jaw muscle strain. Hard acrylic-resin stabilization appliances, typically worn on the upper jaw, are often preferred over soft splints. This preference is due to their durability, better fit, and superior effectiveness in minimizing bruxism activity. Behavioral strategies play a significant role in managing awake bruxism. Habit-reversal techniques help patients become aware of clenching tendencies and learn to break these patterns. Biofeedback therapy, which involves devices that alert patients when they clench their jaws, can also encourage relaxation and better control of jaw movements.(11) In some cases, medications may be prescribed to alleviate symptoms. Muscle relaxants are commonly used to ease jaw tension, while antidepressants can be effective when stress is a major factor. For severe cases of bruxism, botulinum toxin injections (Botox) may help reduce muscle activity.Lifestyle changes can further support bruxism management. Reducing caffeine and alcohol intake, quitting smoking, and maintaining good sleep hygiene can significantly decrease the severity of both awake and sleep bruxism. Establishing regular sleep schedules and creating a relaxing bedtime routine can improve sleep quality, thereby reducing bruxism episodes.

## VII. NIGHT-TIME OCCLUSAL SPLINTS AND PHYSIOTHERAPY

Night-time occlusal splints are commonly used to influence parafunctional activities during sleep. Although earlier studies (Clark 1985, Okeson 1996) suggested that these splints could reduce the effects of bruxism, more recent evidence questions their efficacy (Nagels et al. 2001). While they may decrease nocturnal EMG activities in some patients, results remain inconsistent, with some individuals experiencing no change or even an increase in muscle activity. A short-term randomized controlled trial by Landry et al. found moderate reductions in sleep bruxism with occlusal splints and greater reductions with mandibular advancement devices (MAD), possibly due to localized discomfort when wearing the MAD.(12) Stress management techniques such as progressive muscle relaxation, hypnosis, and biofeedback have also been explored to mitigate bruxism (Hathaway 1995b). Although these approaches may offer short-term relief (Goulet et al. 1993), their long-term effects remain largely unexplored. Physiotherapy interventions, including craniofacial soft tissue mobilization and motor control education, can help influence neuromusculoskeletal factors contributing to parafunctional behaviors. Patients with bruxism can be categorized into three groups: those with a clear correlation between symptoms and parafunctional activities, those without a conscious awareness of the connection, and those without craniofacial symptoms but with evident parafunctional behaviors. Treatment varies depending on the patient's presentation and may include splint therapy, physiotherapy, and educational approaches.(13)

- *Biofeedback and Its Application*

Biofeedback is based on the principle that individuals can "unlearn" bruxism behaviors by becoming aware of adverse jaw activities through aversive conditioning. For awake bruxism, patients can use auditory or visual feedback from surface electromyograms (EMGs) to monitor and control muscle activities. Some clinicians have employed flat occlusal splints as biofeedback tools to remind patients to avoid non-functional tooth contacts, achieving partial success in certain cases. For sleep bruxism, auditory, electrical, vibratory, and even taste stimuli have been explored as feedback mechanisms. Cherasia and Parks developed a method involving contingent arousal with awakenings during sleep, while Nissani experimented with a taste stimulus triggered by capsule rupture in a dental appliance. However, these techniques often disrupt sleep, leading to potential side effects like excessive daytime sleepiness. Long-term validation and safety data for biofeedback in bruxism management remain lacking, highlighting the need for further research.

- *Pharmacological Approaches*

Pharmacological treatments for bruxism have been increasingly studied. Botulinum toxin, which inhibits acetylcholine release at the neuromuscular junction, has shown effectiveness in reducing bruxism activity, particularly in severe cases with comorbidities such as coma, brain injury, amphetamine abuse, Huntington's disease, and autism.

Serotonergic and dopaminergic medications have also been explored, although their effects on sleep bruxism require further investigation. While pharmacological treatments offer potential benefits, they are typically reserved for severe or treatment-resistant cases due to concerns about side effects and long-term safety.(14,15)

- *Occlusal Therapy and Its Controversies*

Occlusal therapy aims to improve the relationship between the teeth’s biting surfaces. Historically, some clinicians believed that adjustments to tooth surfaces could relieve tension in the jaw muscles and reduce bruxism. However, research has shown limited support for these claims. Early studies, such as those by Butler and Frumker, promoted occlusal adjustments without a strong theoretical basis. More recent investigations, including work by Holmgren and Sheikholeslam, failed to find significant evidence that such adjustments reduce bruxism when analyzing daytime electromyographic (EMG) recordings. Greene and colleagues

ISSN No:-2456-2165 https://doi.org/10.5281/zenodo.14936411

even argued that occlusal rehabilitation might further damage the dentition beyond what bruxism has already caused. Given that bruxism is primarily regulated by the central nervous system rather than peripheral factors like dental occlusion, current research suggests that traditional occlusal interventions, such as equilibration and orthodontic alignment, are unlikely to be effective.

## VIII. SUMMARY

Bruxism is a complex condition with multifaceted causes and implications for oral health. Early identification and a tailored management approach are crucial for preventing complications and improving patient outcomes. Prosthodontists and dental professionals must stay informed about evolving definitions and management strategies to provide comprehensive care. Further research is essential to refine treatment modalities and develop more effective, personalized solution.

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