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Sleep Bruxism and Temporomandibular Disorders: A Comprehensive Review

Faisal Taiyebali Zardi[1], Velpula Nagalaxmi[2], Brajesh Gupta[3], Bachanavoni Prathibha Devi[4*]

[1]MDS, Professor, Department of Oral Medicine and Radiology, Sri Sai College of Dental Surgery, Vikarabad, India
[2]MDS, Professor, Department of Oral Medicine and Radiology, Sri Sai College of Dental Surgery, Vikarabad, India
[3]MDS, Professor, Department of Prosthodontics, Sri Sai College of Dental Surgery, Vikarabad, India
[4]Postgraduate Student, Department of Oral Medicine and Radiology, Sri Sai College of Dental Surgery, Vikarabad, India

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***Corresponding author:** Prathibha Devi
Postgraduate Student, Department of Oral Medicine and Radiology, Sri Sai College of Dental Surgery, Vikarabad, India

Abstract

To review current evidence on the epidemiology, pathophysiology, diagnosis, and management of sleep bruxism [SB] and its association with temporomandibular disorders [TMD]. A narrative review of recent literature was conducted, focusing on prevalence, diagnostic methods, clinical manifestations, and therapeutic strategies for SB and TMD. SB is increasingly recognized as a multifactorial condition with neurological, behavioral, and environmental determinants. Its frequent association with TMD complicates diagnosis and management. Advances in diagnostic technologies, including polysomnography, electromyography, and AI-assisted sleep analysis, have improved diagnostic precision. Management strategies include behavioral interventions, occlusal splints, pharmacologic options, and multidisciplinary care, with pediatric cases emphasizing conservative measures. SB and TMD are intricately linked conditions requiring a multidisciplinary diagnostic and therapeutic approach. Future research should focus on standardizing pediatric diagnostic criteria and assessing long-term outcomes of therapeutic interventions.

Keywords: Sleep Bruxism; Temporomandibular Disorders; Polysomnography; Occlusal Splints; Pediatric Dentistry.

INTRODUCTION

Sleep bruxism is defined by the American Academy of Sleep Medicine as a sleep-related movement disorder involving repetitive jaw-muscle activity, characterized by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible [1]. It is a complex condition with a multifactorial origin: biological characteristics, environment, genetics and lifestyle seem to play a role. Bruxism has two distinct circadian manifestations: awake bruxism [AB]. This may occur due to sustained or repetitive tooth contact, or through bracing and thrusting of the mandible. Sleep bruxism [SB] is defined by muscle activity that may be rhythmic [phasic], non-rhythmic [tonic], or a combination of both [mixed] [1]. Temporomandibular disorders [TMD] refer to a group of conditions affecting the chewing muscles and the temporomandibular joints [TMJs]. TMD is considered multifactorial in origin, and bruxism is commonly regarded as one of its major risk factors. Since both conditions are highly prevalent and associated with increased healthcare costs, the relationship between bruxism and TMD has become an important area of research. Several studies have explored this association, but the findings remain inconsistent. While some studies report that bruxism significantly increases the risk of TMD pain and disc displacement, others have found little or no association with muscle or functional symptoms. These conflicting results may be due to variations in symptoms, diagnostic criteria, and examination methods used for both conditions. Sleep bruxism [SB] is commonly diagnosed based on tooth-grinding sounds during sleep along with clinical signs such as tooth wear, jaw muscle pain or fatigue, headaches, or jaw locking on awakening. However, many studies rely mainly on self-reported bruxism, which may overestimate its prevalence. Research has shown that individuals with painful TMD often report bruxism more frequently, even when objective sleep studies do not confirm a higher occurrence [2].

The prevalence of bruxism varies depending on whether it occurs during sleep or while awake. Globally, sleep bruxism affects about 21% of individuals, while

awake bruxism is seen in nearly 23%. Studies using polysomnography, considered the gold standard for diagnosing sleep bruxism, have reported a higher prevalence of around 43%. Among different regions, the highest prevalence of sleep bruxism has been reported in North America [31%], followed by South America [23%], Europe [21%], and Asia [19%]. Age-related differences have also been observed. In North America, sleep bruxism affects approximately 36% of adults and 28% of children. In South America, the prevalence is around 23% in adults and 24% in children. In Europe, it is reported in 23% of adults and 16% of children, while in Asia, about 23% of adults and 14% of children are affected [3]. Studies have consistently shown that sleep bruxism [SB] is more frequently seen in people with stress, anxiety, or sleep disorders [4]. Digital bruxism has also been associated with excessive screen time and disturbed sleep patterns in adolescents. In children and adolescents, bruxism is influenced by several factors such as stress, parasomnias, airway obstruction, and genetic predisposition. Sleep bruxism [SB] in pediatric patients is often seen along with sleep-disordered breathing and behavioral problems, and it may also occur as a comorbid condition with temporomandibular disorders [TMD]. Continuous clenching and grinding place excessive stress on the temporomandibular joint [TMJ] and masticatory muscles, which may lead to tissue damage over time. In children, the diagnosis of SB is mainly based on clinical examination and parental reports, as validated polysomnography [PSG] criteria for pediatric patients are still limited. Management usually includes behavioral modifications, improving sleep hygiene, and, when necessary, the use of intraoral appliances or myofunctional therapy [5].

MATERIALS AND METHODS

A narrative review of the literature was conducted using databases such as PubMed, Google Scholar. Relevant English-language, peer-reviewed articles related to sleep bruxism, temporomandibular disorders, epidemiology, diagnosis, pathophysiology, and management were reviewed. Both adult and pediatric studies were included to provide an overview of the current evidence on the relationship between sleep bruxism and temporomandibular disorders.

RESULTS AND DISCUSSION

The pathophysiology of sleep bruxism [SB] is multifactorial and involves complex mechanisms within the central nervous system. Neurotransmitters such as dopamine and GABA play an important role, and these activities are often influenced by arousals that occur during sleep [6]. Sleep bruxism [SB] is now considered a centrally mediated disorder that is associated with sleep micro-arousals, genetic factors, and increased cortical activity during sleep [7]. Bruxism has also been linked to systemic factors such as obstructive sleep apnea [OSA] and inflammatory mediators [8]. Elevated levels of pro-inflammatory markers have been found in SB patients, suggesting a potential link between neuroinflammation and chronic pain in TMD [9].

Common symptoms of sleep bruxism [SB] include jaw pain, morning headaches, muscle fatigue, tooth wear, tori in the maxilla and mandible, and temporomandibular joint [TMJ] sounds such as clicking or popping. In patients with temporomandibular disorders [TMD], the coexistence of SB may lead to more persistent symptoms and reduced response to treatment [7]. Clinically, signs such as linea alba, tongue indentations, masseter muscle hypertrophy, and tooth attrition are commonly associated with bruxism. In children, SB is often underdiagnosed due to its nocturnal nature and depends mainly on observations made by caregivers or parents.

Sleep bruxism [SB] is diagnosed through a detailed patient history, clinical examination, and reports from the patient or caregiver. In certain cases, additional tests such as electromyography [EMG], which measures muscle activity, and polysomnography [PSG], which evaluates sleep patterns, may be used. Based on international guidelines, SB is classified as possible when identified through self-report, probable when supported by clinical findings, and definite when confirmed by PSG [10]. The diagnosis of temporomandibular disorders [TMD] is based on the DC/TMD protocol, which includes both Axis I for evaluating clinical conditions and Axis II for assessing psychosocial factors [11]. AI-enhanced PSG analysis also improves diagnostic precision.

Management strategies vary depending on severity and patient age. For adults, occlusal splints remain the primary treatment, although their efficacy in altering SB itself is debatable. Cognitive-behavioral therapy [CBT], stress management, and biofeedback are beneficial adjuncts. In pharmacologic therapy, clonazepam, buspirone, and botulinum toxin have been explored with variable success. Physiotherapy to relieve myalgias plays an important role in pain management. Pediatric cases emphasize conservative and reversible approaches including myofunctional therapy, sleep hygiene, and parental counseling. Addressing comorbidities like anxiety, GERD, or OSA is crucial in both groups [12].

CONCLUSION

Sleep bruxism, myofascial pain and temporomandibular disorders are intricately related conditions with overlapping pathophysiological and clinical aspects. A multidisciplinary approach involving dental, cognitive behavioral therapy, and sleep medicine is essential for effective management. While significant strides have been made in understanding the neurobiology and clinical course of SB and TMD, future research should aim at standardizing pediatric diagnostic criteria and evaluating long-term treatment outcomes through a multidisciplinary approach.

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Abbreviations

SB: Sleep Bruxism
TMD: Temporomandibular Disorders
TMJ: Temporomandibular Joint
TMJs: Temporomandibular Joints
PSG: Polysomnography
EMG: Electromyography
CBT: Cognitive Behavioral Therapy
OSA: Obstructive Sleep Apnea
GERD: Gastroesophageal Reflux Disease
DC/TMD: Diagnostic Criteria for Temporomandibular Disorders
AI: Artificial Intelligence
AB: Awake Bruxism

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