



## Current Methods Used in the Diagnosis of Sleep Bruxism

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### Abstract

Bruxism is a parafunctional habit characterized by repetitive muscle movements. It is divided into two groups: sleep and awake bruxism. Many factors play a role in the etiology of bruxism. Sleep disorder is particularly noteworthy in the pathogenesis of bruxism, and the relationship between sleep and bruxism is complex.

In addition, the patient's self-report, taking an accurate anamnesis, performing a correct clinical examination, as well as the use of auxiliary instruments and methods play a key role in the diagnosis of bruxism. Confirming the diagnosis of possible bruxism in the patient, increased life quality, as well as the long-term success of dental treatments, implants and prosthetic restorations.

The aim of this review is to convey the most recently methods used in the diagnosis of bruxism and to raise awareness for clinicians on the way to diagnosis when they encounter a possible case of bruxism.

**Keywords:** Bruxism; Sleep Bruxism; Diagnostic Methods; Sleep Disorder; Dentistry

### Abbreviations

#### Bruxism

Broadly defined, bruxism is the term given to repetitive muscle movements characterized by teeth clenching or grinding occurring during sleep or wakefulness [1]. In 2018, in addition to this definition, bruxism was divided into sleep bruxism and awake bruxism. Sleep bruxism refers to the activity of the chewing muscles during sleep and is not considered a sleep disorder in healthy individuals. Awake bruxism, on the other hand, is characterized by repetitive or continuous tooth contact or mandibular movements during wakefulness, representing activity of the chewing muscles [2].

While the prevalence of awake bruxism in adults ranges from 22% to 30%, the prevalence of sleep bruxism is determined to be between 1% and 15%. In children and adolescents, the prevalence of sleep bruxism ranges from 3% to 49% [3]. Although gender ratios have been reported in only a few studies, no significant relationship has been found between bruxism and gender [4].

#### Etiology of bruxism

Although the etiology of bruxism is not precisely known, it is considered a complex and multifactorial phenomenon involving biological, psychological, and environmental factors. In current approaches, etiological factors are mainly divided into two subgroups: peripheral (morphological) and central (pathophysiological and psychological) factors. While morphological factors associated with occlusal irregularities or deviations in bone anatomy

were previously thought to play a role in etiology, recent studies suggest that pathophysiological factors are more significant [5,6]. Psychosocial factors such as stress and anxiety are particularly associated with bruxism [7]. In addition, environmental risk factors include smoking, alcohol, caffeine consumption, use of drugs, or certain medications (e.g., SSRIs) [8-10].

#### Symptoms of bruxism

Various clinical symptoms can be observed in patients with bruxism. Sensitivity and stiffness in the chewing muscles are major clinical symptoms. Limitation in mouth opening, pain and tenderness in the temporomandibular joint during palpation, pain and tenderness in the preauricular region can also be associated with bruxism. Particularly in patients with prolonged bruxism, losses in occlusal morphology, tooth wear, or breakage of prostheses or other restorations can be observed [11]. Sensitivity in teeth occurs due to enamel and dentin losses resulting from tooth wear. In advanced stages, tooth mobility can also be observed when the periodontal ligament becomes inflamed. Bruxism can also be associated with other parafunctional habits such as cheek biting or lip biting. Particularly during sleep, unpleasant sounds of grinding teeth that can wake up another person sleeping in the same room are significant signs of bruxism. It is crucial to inquire about all these symptoms in detail from the patient verbally and, if necessary, from the patient's relatives, and to support them with clinical examination in the diagnosis of bruxism.

### Evaluation of bruxism

Non-instrumental methods, instrumental methods, cutting points, and grading are used in the evaluation of bruxism [2].

Non-instrumental methods generally include the individual's verbal report, questionnaires, and clinical examination. They are still the primary method used in the diagnosis of sleep and awake bruxism [2].

Among the instrumental methods are clinical applications such as EMG and polysomnography. Polysomnography is considered the gold standard for the diagnosis of sleep bruxism. In this method, data such as the patient's brain waves, muscle activity, electrocardiogram (ECG), pulse oximeter, nasal and oral thermistors, nasal cannula pressure transducer, sound, and video are recorded simultaneously in specialized sleep laboratories [12]. Since it is not feasible to perform this procedure routinely in a dental clinic and natural sleep cannot be provided in a laboratory setting, alternative devices have been developed for recording at home. Portable EMG recording units such as Bruxoff, [7] MOOMIN-KEI [13], and ProComp5 [14] can be given as examples.

In addition to all these methods, occlusal examination methods using a vacuum pressing technique, which are more suitable for clinical conditions and simpler and less costly for the diagnosis and treatment of bruxism, have been reported [15]. Particularly noteworthy is the study by Onodera, *et al.* which used a vacuum-pressed BruxChecker plate covered with red-colored paint to examine the occlusal pattern during sleep bruxism [16].

### BruxChecker

BruxChecker is produced from transparent polyvinyl chloride with a thickness of 0.1 mm. (Scheudental, Germany). This plate contains red-colored paint [16]. Initially, an impression is taken from the upper jaw for the plate, and a personal plaster model is obtained from these measurements for each patient. Then, the BruxChecker is adapted to these plaster models using a vacuum plate machine and trimmed along the gingival margin. As a result of this process, the individually prepared plate is ready for use.

Patients were provided with the plate to wear during sleep for a certain period, and simultaneously, masseter muscle activities were measured with a portable EMG device. As a result of this study, a significant positive correlation was observed between bruxism attacks and worn surfaces on the plate [17].

In another study conducted on individuals with sleep bruxism as an example of BruxChecker usage, besides the use of the plate, individuals' stress periods were investigated with specific scales. In the study, it was found that wear on the plate increased from the first night to the last night, and especially in patients with disc displacement, wear on the plate increased significantly during stressful periods [18].

### Standardized tool for the assessment of bruxism (STAB)

It is known that bruxism is a multifaceted and long-debated phenomenon. Methods have been developed to facilitate the evaluation and comparison of this phenomenon. For this purpose, STAB is a standardized method created to assess bruxism status, comorbidities, etiology, and outcomes in a multidimensional manner. This method consists of two main axes (Axis A and Axis B). While Axis A deals with bruxism status and outcomes, Axis B deals with the etiology of bruxism and comorbid conditions [19].

#### Axis A

Subject-based assessment includes areas such as sleep bruxism (A1), awake bruxism (A2), and patient complaints (A3). In the field of sleep bruxism (A1), questions from the Oral Behavior Checklist (OBC) [20] are included. These questions include evaluations related to teeth clenching, grinding, and mandibular protrusion over the past few months. The same questions are repeated for past history. The awake bruxism (A2) field is also similar. In A3, patient complaints such as TMD [21], headache [21], tinnitus [22], and tooth wear [23] are questioned.

Clinic-based assessment includes information obtained from the patient through clinical examination regarding joint and muscles (A4), intraoral and extraoral examination (A5), and teeth and restorations (A6) [19].

Instrumental assessment consists of areas such as sleep bruxism (A7), awake bruxism (A8), and the use of additional instruments (A9). Area A7 mainly includes sleep electromyography. In A8 area, data on awake bruxism are collected using Ecological Momentary Assessment (EMA) for more than a week [24]. This area also includes EMG results during wakefulness. Factors associated with stress, changes in saliva due to gastroesophageal reflux are associated with area A9 [19].

#### Axis B

Axis B, which contains information about the etiology of bruxism and comorbid conditions, consists of 5 separate areas. These areas are composed of the following: [19]

- Psychosocial Evaluation (B1)
- Simultaneous Evaluation of Sleep-Related Conditions (B2)
- Simultaneous Evaluation of Non-Sleep-Related Conditions (B3)
- Prescription Drug and Substance Use (B4)
- Evaluation of Additional Factors (B5).

### Conclusion

This review categorizes the phenomenon of bruxism into two categories, sleep bruxism and awake bruxism, and extensively discusses etiology, symptoms, and diagnostic methods. Particularly emphasized is the critical role of the patient's self-report, accurate history taking, clinical examination, and the use of appropriate instruments in the accurate diagnosis of bruxism. In this context, it

is noted that instrumental methods such as polysomnography and new tools such as BruxChecker can contribute to the diagnostic process, and methods such as Standardized Tool (STAB) can guide clinicians by allowing multidimensional evaluation of bruxism. The aim of the review is to provide clinicians with the necessary tools and awareness to undergo a more informed and effective diagnostic process when encountering cases of bruxism.

### Conflict of Interest

"The authors deny any conflicts of interest".

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