

# THE INFLUENCE OF SLEEP BRUXISM AND OSAS ON DENTAL HEALTH

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## ABSTRACT

**Introduction:** Sleep bruxism (SB) presents as repetitive bracing or thrusting movements of the mandible, encompassing teeth clenching or grinding, which affects oral health. Obstructive sleep apnea (OSA) is a respiratory disorder during which total or partial airway obstructions appear during sleep, leading to arousals in response to respiratory effort. In the highly prevalent nowadays obstructive sleep apnea syndrome (OSAS) patients suffer from repeated airway collapses. This can cause various disorders: daytime sleepiness and drowsiness, cognitive disorders, problems with the cardiovascular and metabolic systems.

**Aim:** The present study aims to investigate the influence of SB and OSAS on dental health.

**Materials and Methods:** For the period January 2020–March 2021, in the available databases (PubMed, BioMedCentral, ScienceDirect, Scopus, Web of Science), a systematic analysis of scientific publications has been conducted examining the influence of SB and OSAS on dental health.

**Results:** Obstructive sleep apnea syndrome is a clinical risk factor for SB. It can lead to tooth attrition and abrasion, fractures, hypersensitivity, periodontal diseases, dysfunction in the temporomandibular joint or muscles of mastication (including hypertrophy), headaches and poor quality of sleep. Malocclusions are connected to SB. Authors report that symptoms of apnea and clenching are more frequent in OSAS patients.

**Conclusion:** Obstructive sleep apnea syndrome and SB lead to dental health problems, which are encountered in the dental office.

**Keywords:** sleep bruxism, obstructive sleep apnea syndrome, dental health

## INTRODUCTION

Respiratory disorders are a current problem that affects a large number of people around the world. Sleep bruxism (SB) includes repetitive bracing or thrusting movements of the mandible, encompassing teeth clenching or grinding, which affects oral health (2).

The total (apnea) or the partial (hypopnea) airway obstruction leading to arousals in response to respiratory effort characterizes the respiratory disorder known as obstructive sleep apnea (OSA) (3). Obstructive sleep apnea is a disease that belongs to the group of respiratory disorders during sleep (ICSD-2) (3), outlined by repeated pauses in breathing due to collapse of the upper respiratory tract. This respiratory disorder portrays general (apnea) or partial (hypopnea) (3,33,37,40,54). Respiratory pauses during sleep resulting from upper airway obstruction last  $\geq 10$  seconds and have a frequency  $\geq 5$  pcs/h. Obstruc-

tive sleep apnea can be described as a systemic disease with a progressive course.

In the highly prevalent nowadays obstructive sleep apnea syndrome (OSAS) patients suffer from repeated airway collapses. This can cause various disorders: daytime sleepiness and drowsiness, cognitive disorders, problems with the cardiovascular and metabolic systems.

As stated in literature data, the problem of bruxism affects 8–31% of the population with division into subtypes left out and without significant differentiation concerning gender. Sleep bruxism occurs in approximately 13% and awake bruxism occurs in 22–31% of adults (27). All cases are associated with various sleep disorders. The consequences of this disease are accompanied by a constant headache, orofacial pain, temporomandibular disorders, tooth wear, pain in the masticatory muscles, temporomandibu-

lar disorders, and subsequent deterioration of quality of life.

Bruxism during sleep can occur simultaneously with various other sleep disorders, for instance—insomnia, sleep apnea, and others. Studies so far have not identified the root cause of the problem and the consequences, whether sleep disorders lead to bruxism or vice versa. Data in literature is contradictory.

The present study targets at investigating the influence of SB and OSAS on dental health.

## MATERIAL AND METHODS

For the period January 2020–March 2021, in the available database (PubMed, BioMedCentral, ScienceDirect, Scopus, Web of Science), a systematic analysis of scientific publications has been conducted examining the influence of SB and OSAS on dental health.

## RESULTS

Obstructive sleep apnea syndrome is considered a clinical risk factor for SB (15,16,21,33,36,38,39,51). Globally, there is an increasing frequency of OSA in humans and most frequently—in adult populations (33,41).

Obstructive sleep apnea leads to serious consequences for human health and has a negative effect on patients' quality of life. Not treating OSA could be a substantial risk factor for developing heart diseases, impaired glucose tolerance, hypertension, cognitive deficits, ischemic stroke, severe daytime drowsiness, diabetes, depression, headache, and anxiety. During OSA, the amount of oxygen in the blood decreases and the concentration of carbon dioxide increases. Blood with low oxygen concentration level is carried to the brain, leading to a risk of headaches in patients, a morning headache in particular. The obstructive sleep apnea and the headache have a complex relationship. Morning headaches may occur for a number of reasons, from poor sleep quality to stress or various chronic conditions. Morning headaches are most often caused by a chronic lack of sleep quality and a presence of sleep disorders, such as OSA. Different clinical studies have linked sleep disorders to specific headache diagnoses (tension-type, cluster, hypnic, migraine) and non-specific headache patterns (chronic daily, "awakening," or morning headache). Acute absence of regulation of sleep is one of the most common headache triggers. Obstructive sleep apnea is a risk factor for headache complaints in patients. Different scientific researches have shown that one out of thirteen people experiences morning headaches. This can also be the re-

sult of a physiological change in the body, such as the production of excessive adrenaline in the morning, which can lead to migraine headaches. These symptoms in people with OSA are 2 to 8 times less common than morning headaches (61).

A literature review covering OSA and its implications on the audio-vestibular neurologic system, analyzing 11 articles, came to the conclusion that in most cases hypoxia caused by OSA affects hearing and vestibular control of the body. Treating OSA alleviates the symptoms and lowers the risk of accidents (53).

Sleep bruxism presents rhythmic activations of masticatory muscles with unknown pathophysiology (24). Grinding and/or clenching of the teeth as well as bracing or thrusting of the mandible during sleep are identified. Bruxism can seriously affect life quality through dental and orofacial problems such as masticatory muscle tenderness and pain, tooth attrition and abrasion, headaches and temporomandibular disorders (TMDs) (6). Sleep bruxism is not characterized by gender differences in different ages. Its prevalence tends to decrease with age (27).

Scientific studies show that malocclusions are also related to the occurrence of SB (50). Research data reports that apnea and clenching symptoms are more frequent in OSAS patients, posterior deviation of the maxilla or mandible, different orthodontic problems (30,34), xerostomia and tooth decay also derived from it. Obstructive sleep apnea and SB lead to dental oral health problems. Bruxism during sleep could also be one of the main causes of morning headaches and temporomandibular dysfunction (7,26).

Dentists face the consequences of SB in their clinics. Sleep bruxism can be caused by a number of predisposing factors, including alcohol drinking, gender predisposition, age of the individual, gastroesophageal reflux disease (GERD), disorders of the dopaminergic system, smoking (5, 47). However, the exact reason for developing bruxism during sleep remains obscure.

Bruxism can have different causes and mechanisms, despite existing in some individuals both during wakefulness and sleep (22,23). Usually, in healthy individuals, SB is not classified as a health problem even though it can be linked to other sleep disorders, for example, periodic limb movement, gastroesophageal reflux, insomnia, sleep-disordered breathing (24,31). In the absence of critical oral damage or comorbidities, sleep or awake bruxism should be termed as normobruism. Pathologic forms of bruxism are usually diagnosed when oral damage or comorbid diseases are visible (26, 56). Sleep bruxism can lead to dental attrition, teeth and restorations

fractures, a loss of vertical dimension of occlusion and a dental sensitivity.

Sleep bruxism diagnosis is often reached by analyzing information from patients' reports—teeth clenching and grinding, accompanied with transient morning jaw muscle pain or headaches. Visual assessment of tooth wear by the clinician is done as well. Nevertheless, in scientific studies, the exclusive use of questionnaires is not reliable enough. Often, not all of the patients are aware that they grind their teeth (26,31,46,65). Sleep bruxism episodes are not always related to a particular tooth contact. Other specific concomitant sleep disorders such as gastric reflux, apnea, and hyposalivation can cause the same symptoms (1,29,38,63).

Polysomnography aids to diagnose SB by measuring rhythmic masticatory muscle activity (RMMA) in an hour of sleep (26,32,34,35,48,53,57,64).

Recently, bruxism movements during sleep have been linked to disorders of the quality and quantity of sleep, for instance: OSA, insomnia, and others. Nonetheless, this is a controversial issue among scientists (10,12,17,26,28,31–35,44,49,52,55,58). According to survey-based research OSA is usually diagnosed in middle-aged individuals, due to the age (42,60,65). One can wake up at night and suffer from insomnia without understanding the reason, because of the grinding of teeth.

Sleep bruxism can also lead to tooth decay, periodontal diseases, dysfunction in the temporomandibular joints or masticatory muscles, ear pain in the absence of other symptoms, headache, fracture of teeth, hypersensitivity, hypertrophy of the masticatory muscles and of sleep (1,4,13).

The following symptoms need to be addressed: unexplained defects, abrasion of teeth, increased tooth sensitivity, night awakenings, constant biting of the cheeks, soreness of the jaw and face, and ear pain in the absence of other diseases.

According to some studies, alcohol intake and smoking may significantly increase the risk of bruxism and morning headaches.

The gold standard when treating OSA is the Continuous Positive Airway Pressure (CPAP) therapy (Sullivan, 1981). Research has shown that more than 1/3 of patients using CPAP therapy are able to reduce OSA (8,14,33,36,38) and its consequences in dental health. Although CPAP therapy is highly effective for treating patients with OSAS, there are some issues—compliance and adaptation to devices (9). Oral dental appliances are an alternative approach to treat OSA (11). Sleep bruxism affects the dental treatment of OSA. In some clinical cases, mild and moderate OSAS, oral appliances are consid-

ered more reliable to control sleep apnea and bruxism than CPAP. (19,20,44) The relationship between SB and OSAS in studies and results is controversial (17,25,32,42,45,50).

Polysomnography (PSG) done in a licensed sleep laboratory, although time-consuming and expensive, is proven to be the gold standard in the diagnosis of OSAS (59) and detecting SB (62). Authors have examined the bond between SB and OSA in laboratory PSG patients. Research on the topic is still insufficient.

Sleep bruxism can be reduced with mandibular advancement oral appliances (14,18).

## CONCLUSION

Obstructive sleep apnea syndrome and SB lead to dental health problems. Therefore, dentists often come across their effects in the clinical setting. Prevention, screening tests, early diagnosis programs and comprehensive treatment are essential to improve the prognosis and favorable outcome of the disease. The teamwork of sleep specialists and dentists is essential for early diagnosis and treatment of the disease.

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