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BRUXISM AMONG ATHLETES: A NARRATIVE REVIEW

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ABSTRACT

Bruxism poses unique challenges for athletes due to heightened stress, anxiety, and performance demands that may exacerbate its prevalence and impacts.
Aim: The aim of this study is to integrate evidence on prevalence, risk factors, impacts, diagnosis, and management strategies of bruxism among athletes.
Materials and methods: Searches of PubMed, the Virtual Health Library, LIVIVO, and Google Scholar used a hybrid search strategy combining semantic and keyword-based retrieval methods. After screening 240 records, 27 studies met the eligibility criteria and were included in the narrative review.
Results: The aggregated data reveals that athletes show a high prevalence of secondary bruxism, its primary aetiology being stress disorders fueled by the high-performance pressure and inadequate diagnosis and methods of management.
Conclusions: Based on this narrative review it can be established that bruxism among athletes is primarily associated with stress disorders, categorising itself as secondary bruxism. The relationship between the prevalence of bruxism among athletes can be described as a positive feedback loop. The high stress environment to which athletes are exposed to pre-competition increases the likelihood of bruxism, while the risk factors of bruxism have a negative impact on performance, further increasing stress in this vicious cycle.

KEYWORDS

Bruxism, Grinding of Teeth, Athletes, High Intensity Sports, Stress, Sleep Disorders

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1. Introduction

Bruxism is defined by the 2024 international consensus meeting as “a repetitive jaw- muscle activity characterized by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible.” (Verhoeff et al., 2025). Present in two primary forms; “sleep bruxism (SB), a masticatory muscle activity during sleep that is characterised as rhythmic (phasic) or non- rhythmic (tonic) and is not a movement disorder or a sleep disorder; as well as awake bruxism (AB), a masticatory muscle activity during wakefulness that is characterised by repetitive or sustained tooth contact and/or by bracing or thrusting of the mandible and is not a movement disorder”, but a motor behaviour (Verhoeff et al., 2025). Bruxism may be connected with certain disorders in one of three potential ways: “bruxism of which it is as yet unknown whether or not it is actually associated with a certain disorder or that both are only present at the same time (i.e., primary bruxism), bruxism that is proven to be associated with a certain disorder, treatment or lifestyle (i.e., secondary bruxism) and bruxism that is part of the signs of a certain disorder, that is, the disorder causes jaw-muscle activities to occur.” Questions arise whether this third type of bruxism can still be classified as bruxism (Verhoeff et al., 2025). According to the 2018 consensus, bruxism may be associated with a given health outcome in one of three ways: “as a risk factor, when it is linked to one or more negative health outcomes; as a protective factor, when it is linked to one or more positive health outcomes; or as a neutral factor, when it is neither harmful nor beneficial” (Verhoeff et al., 2025). Examples of risk factors include tooth wear, temporomandibular joint disorders, muscle fatigue, and impaired sleep quality, which may contribute to broader physiological strain and reduced physical performance (Carra et al., 2012). On the other hand, protective factors are crucial to our survival. For example, for patients who are diagnosed with sleep-related breathing disorders, for example Obstructive Sleep Apnea (OSAS) the brainstem initiates the automatic thrusting of the mandible in order to increase the patency of the upper respiratory tract during sleep, maintaining sufficient airflow to the lungs. This behaviour is deemed ‘protective sleep bruxism’ (Lobbezoo et al., 2018). A similar survival mechanism is observed in patients who suffer from Gastroesophageal reflux disorder (GERD), in which the clenching of teeth and bracing of the

mandible encourages the production and swallowing of saliva, which decreases the risk of chemical erosion of the upper respiratory tract as well as of detrimental chemical tooth wear (Lobbezoo et al., 2018). As documented in recent literature, the prevalence of severe tooth wear in adults drastically increases with age, from 3% at the age of 20, increasing to 17% at the age of 70 years. Tooth wear is typically a physiological slow process that doesn't, under normal circumstances lead to any subjective symptoms, however "when it becomes pathological, dental hypersensitivity and/or dental pain (being a form of oro-facial pain) may occur" (Wetselaar et al., 2019). Another study affirms, "these rates escalate in high-stress environments, where psychosocial factors like anxiety and emotional tension play a pivotal role in triggering episodes" (Kuhn & Türp, 2018). The aim of this study is to integrate evidence on prevalence, risk factors, impacts, diagnosis, and management strategies of bruxism among athletes.

2. Materials and methods:

Electronic literature searches were conducted in PubMed, the Virtual Health Library, LIVIVO, and Google Scholar. A hybrid search strategy combining semantic and keyword-based retrieval was used to maximize coverage. Search terms included: "bruxism prevalence in athletes," "sports and oral health," "sleep-awake grinding," "bruxism risk factors," "stress among athletes," "occlusion TMD," "bruxism impact on athletes' performance," "dental wear and muscle fatigue sleep quality," "bruxism diagnosis and treatment," "athletes and mouthguards occlusal splints physiotherapy," and "sleep bruxism and PSG polysomnography."

Titles and, when available, abstracts were screened to determine whether the publications were relevant to the topic of this narrative review. Full texts were retrieved when studies addressed associations between high-intensity sport and its effects on mental and physical health, as well as oral signs and symptoms suggesting the presence of bruxism. Eligible studies reported original research in athletes, used an appropriate study design, or included a review of one of the subtopics addressed in this review. To avoid missing relevant literature, the reference lists of included full-text articles were also hand-searched. Studies were excluded if they were single-case reports, focused on rare disorders or syndromes, addressed restorative treatment procedures, or were written in languages other than English or Polish. The search identified 240 publications. After duplicate removal and relevance screening, 100 records were assessed against the eligibility criteria; 80 were excluded, leaving 27 papers for inclusion in this narrative review. Given the heterogeneity in study design and quality, a narrative synthesis was the only feasible approach.

3. Results:

3.1 Prevalence in athletes:

Prevalence estimates for bruxism in athletes consistently surpass general population benchmarks, with meta-analytic syntheses reporting an overall pooled rate of 34% (95% confidence interval: 0.26-0.42) across SB and AB, rising to 36% in able-bodied athletes compared to 27% in para-athletes (de Sales et al., 2025) and up to ~60-70% in elite sports (Różak et al., 2026). Another meta- analysis of athletic cohorts pegged prevalence at 38% (95% confidence interval: 25-52%), ranging from 15% to 70% across studies, markedly higher than the 8-20% in non-athletic adults (Okshah et al., 2025). Differentiation by type reveals SB at 21% globally but up to 43% when confirmed by polysomnography, while AB affects 23%, though athlete-specific data often conflate types due to predominant self-report methods (Zieliński et al., 2024). Sport-specific rates highlight elevated burdens in high- intensity disciplines, with combat sports showing 58% prevalence and weightlifting 50%, attributed to forceful jaw clenching during exertion (Okshah et al., 2025). In climbers, a niche athletic group, AB prevalence reaches 51.1% and SB 22.7%, exceeding general adolescent rates of 4-13% for AB and 8-21% for SB (Zięba & Byś, 2019) (Wetselaar et al., 2020).

3.2 Risk factors and correlation:

Athletes face unique risk factors: psychological stress, anxiety, and performance pressure, which are strongly linked to awake bruxism, as is the physical strain of high-intensity training (Różak et al., 2026) (Freiwald et al., 2020). Risk factors centre on psychosocial elements, with stress and anxiety emerging as key drivers; each incremental point on stress scales increases AB risk by 3.3% and SB by 3.2%, particularly in males during high-demand phases like manual training analogs to athletic regimens (Winocur et al., 2019) (Levartovsky et al., 2022). Anxiety levels show dose-dependent associations, with moderate anxiety elevating AB odds (odds ratio 1.6) and severe anxiety SB odds (odds ratio 2.35), alongside poor sleep quality (PR 1.54 for SB, 1.34 for AB) and morning chronotypes predisposing to SB (Winocur et al., 2019) (Aguiar et al., 2024). Higher socioeconomic status correlates with increased AB (4.6-4.9% vs. 3.7-4.0% in low SES), potentially

reflecting greater competitive pressures in elite athletics (Wetselaar et al., 2020). Comorbidities like TMD are prevalent, with both SB and AB linked to pain-related TMD, muscle disorders, and disk displacement (odds ratio 2.17 for TMD symptoms in SB), though AB uniquely associates with arthralgia and greater jaw functional limitations (Cigdem Karacay & Sahbaz, 2023) (Kalamir et al., 2007).

3.3 Impacts on health and athlete performance

Impacts on athletic performance are multifaceted, with bruxers demonstrating compromised physical metrics: reduced strength (standardized mean difference -0.48), endurance (-0.41), and coordination (-0.45), alongside slower reaction times (-0.33) (Okshah et al., 2025). Sleep disruptions from SB exacerbate these, correlating with habitual inefficiency (PR 1.32) and disturbances (PR 1.53), while AB ties to elevated anxiety (standardized mean difference 0.62) and worse overall sleep quality (standardized mean difference -0.56) (Okshah et al., 2025) (Serra-Negra et al., 2014). Chronic exposure to performance pressure, and subsequently in many cases bruxism, leads to fostering fatigue, pain, and reduced neuromuscular efficiency. Injury risk doubles (odds ratio 2.5), potentially via TMD- mediated pain and fatigue, with headaches frequent in bruxing adolescents (odds ratio 2.94 for high facial pain in AB) (Okshah et al., 2025) (Nascimento et al., 2024) (Winocur et al., 2019). Tooth wear affects nearly all cases (99%), involving 12.4 teeth on average, and comorbidities extend to migraines, where bruxism amplifies disability, as seen in higher Migraine Disability Assessment (MIDAS)/Headache Impact Test (HIT-6) scores in chronic cases (Prado et al., 2023) (Godk et al., 2021).

3.4 Mechanisms

Bruxism present in athletes is predominantly secondary bruxism, i.e., associated with a certain disorder, treatment or lifestyle, in this case, the aetiology being stress disorders and intense lifestyles. On account of the numerous negative health outcomes, it also qualifies as a risk factor, having no neutral or positive effects on the lives of athletes.

3.5 Diagnostic methods

Depending on the actual clinical need the diagnostic assessment mode should be carefully chosen between self-reporting, clinical examination or device-based tools, such as polysomnography and electromyography. A combination of methods may be used, keeping in mind the limitations of each assessment mode, being namely: the subjective quality of self-reporting, reflecting the patients experiences and beliefs, with the limitation that the patient is aware of the behaviour. The clinical examination measures strictly the clinical signs that may be present, rather than the actual behaviour, requesting the need for differential analysis excluding other potential causes of these signs. Signs include linea alba along the bite line of the cheeks, masticatory muscle hypertrophy, tooth tissue damage, change in composition and quantity of saliva, repeated damage to prosthetic restorations, to name a few (Matusz et al., 2022). Lastly device-based tools, which give a quantitative measure of jaw-muscle activity, are limited by their high cost and small availability to most patients (Verhoeff et al., 2025). New tools have been developed, such as STAB, Bruxscreen and EMA (Riyaz et al., 2025). Standardized Tool for the Assessment of Bruxism (STAB) integrates the use of all three methods: clinical exams, self-reporting and device-based tools, while Bruxscreen has been developed for the use of large-scale epidemiological research projects as well as general dental practices, relying on a questionnaire and clinical examination (Manfredini et al., 2024) (Lobbezoo et al., 2024). Ecological momentary assessment (EMA) is an emerging method focusing on smartphone use, currently being tested to assess its effectiveness (Różak et al., 2026).

3.6 Management strategies for athletes:

The management strategy for bruxism should aim to decrease the risk of negative health outcomes of the behaviour, however without eliminating its positive health outcomes, depending on the established aetiology of the specific case. A holistic and multidisciplinary approach to athlete health care should be applied, involving the expertise of physiotherapists, dentists, therapists, sports managers and specialists in the treatment of pain (Różak et al., 2026).

Treatments are largely behavioural and symptomatic: stress management, habit-reversal therapy, splint therapy, physiotherapy, and biofeedback can reduce jaw muscle overactivity. In athletes, awake bruxism can impair orofacial health and potentially affect performance by causing jaw pain, headaches, and fatigue (Różak et al., 2026).

In cases of established bruxism, the following reversible procedure; SMS Therapy, is recommended. It consists of Self Observation, the objective being, bringing to awareness clenching or grinding activities during waking hours, as well as pear observation to evaluate the presence of sleep bruxism; Muscle Relaxation, by learning and the regular performance of relaxation techniques, and, as a consequence thereof, the patients' improved body perception and stress management; and lastly Splint Therapy, namely the Michigan splint, whose goal is to protect tooth structures from attrition, dental restorations from damage and oral structures (the periodontium, masticatory musculature and jaw bone) from overload (Gholampour et al., 2019) (Kuhn & Türp, 2018) (Gay-Escoda et al., 2011). It is important to note that this procedure isn't applicable to bruxism of all aetiologies, for example Splint Therapy isn't suitable for the management of bruxism associated with OSAS, therefore the management strategy should be individually chosen in accordance with the principal mechanism present in the chosen case. However, for athletes whose bruxism aetiology is primarily stress based, the SMS Therapy is perfectly adequate.

4. Discussion

The relationship between the prevalence of bruxism among athletes can be described as a positive feedback loop. Based on the above results the high stress environment to which athletes are exposed to pre-competition and while competing increases the likelihood of bruxism, while the risk factors of bruxism have a negative impact on performance, further increasing stress in this vicious cycle. Athletes, particularly in high-stake disciplines, face chronic exposure to performance pressure, which may trigger or worsen awake bruxism during focused exertion and sleep bruxism amid disrupted sleep patterns, which are critical for recovery. This not only compromises oral health through tooth wear and TMD but also impairs athletic performance by fostering fatigue, pain, and reduced neuromuscular efficiency, highlighting the need for targeted research to safeguard athlete well-being and optimize outcomes.

4.1 Limitations

A limitation of this study is its lack of consideration of other factors that could potentially change our point of view when the analysis of results in this narrative review. Not mentioned to this moment is the effect of medications and addictive substances on athlete performance, stress and sleep disorders, as well as the signs and symptoms of bruxism (de Baat et al., 2020). A new study addressing this topic would provide a closer look at the possible relationship between this and countless other unnamed factors on bruxism. New research is required to further deepen our understanding of bruxism and its prevalence diagnosis and management among athletes.

5. Conclusions

In conclusion, the available evidence indicates that bruxism is more prevalent among athletes than in the general population, particularly in high-intensity and high-pressure sports. The behaviour is closely linked to stress, anxiety, and performance demands, suggesting that in many athletes it may represent a form of secondary bruxism rather than an isolated motor behaviour. Although bruxism may sometimes have protective qualities in specific clinical contexts, in athletes it is more often associated with negative consequences on physical and mental health, namely: tooth wear, temporomandibular disorders, pain, sleep disruption, fatigue, and reduced performance. These findings highlight the need for early recognition and a holistic and multidisciplinary approach that combines dental care, stress management and prevention strategies. Further research using standardized diagnostic methods and sport-specific populations is needed to better investigate the effectiveness of present and newly developed management strategies and diagnostic methods. The 2025 consensus addressed questions and confusion posed by clinicians, educators, researchers and patients since the publication of the 2018 consensus paper. With time more questions may arise with increased clinical testing and available results, and with this the need for a new consensus, allowing for the further refinement of our understanding of bruxism.

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Validation: N.B. and M.K.
Formal analysis: K.G. and D.S.
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Data curation: E.M. and N.B.
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Supervision: E.P. and W.J.
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