

Cite as: Archiw EuroMedica. 2024. 14; 4. DOI [10.35630/2024/14/4.415](https://doi.org/10.35630/2024/14/4.415)Received 18 June 2024;
Accepted 16 August 2024;
Published 20 August 2024

THE ROLE OF CORTISOL IN THE ETIOLOGY AND TREATMENT OF BRUXISM

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ABSTRACT

Bruxism is an issue that has a major influence on both dental and general health. It is defined by the involuntary clenching and grinding of the teeth. Bruxism can present itself in two main ways: during sleep and during wakefulness. This study investigates the function of the stress hormone cortisol in the development and treatment of bruxism. Those who have bruxism often have elevated cortisol levels, which suggests a strong correlation between stress and bruxism episodes. The study examines the body of research, emphasizing the link between bruxism and hormone changes brought on by stress. It also looks at possible cortisol-management-based therapeutic approaches. Pharmacological therapy, lifestyle adjustments, and stress management strategies are examples of effective interventions. Comprehending the intricate relationship between bruxism and cortisol will aid medical professionals in creating all-encompassing therapy strategies that can ultimately enhance patient results and quality of life.

Keywords: Bruxism, Cortisol, Bruxism etiology, Bruxism treatment

INTRODUCTION

Bruxism, which is characterized as an uncontrollable clenching and grinding of the teeth, is a disorder that has serious effects on both general health and dental health. Typically, there are two forms of bruxism: awake bruxism and sleep bruxism. [1] Currently, an expert consensus definition has been adopted, which differentiates bruxism into two types:

1. Sleep bruxism (SB) is defined as the stereotypical activity of the oral cavity and jaw, characterized by rhythmic (phasic) or non-rhythmic (tonic) activity during sleep. [2]
2. Awake bruxism is a muscular chewing activity during wakefulness that is characterized by repetitive or sustained tooth contact and/or jaw bracketing or thrusting. [3]

Both types of bruxism can result in serious oral and facial issues if left untreated. [1] Its prevalence varies

widely, ranging from 5.9% to 49% in adults, depending on diagnostic criteria. [4] The differences in results between studies might be mainly related to the use of unreliable tools for the diagnosis. It should be noted that bruxism can also result in headaches, pain in the temporomandibular joint (TMJ) and craniofacial muscles, pathological tooth destruction, and failure of dental procedures (e.g., prosthetic repair). [5]

The precise etiology of bruxism remains unclear, but multifactorial, involving a complex interplay of genetic, environmental, and psychological factors. Furthermore, risk factors for bruxism occurrence may include disturbances in neurotransmitters (such as serotonin and dopamine), neurological diseases, trauma, drug use, smoking, alcohol and psychological factors, including stress [6]. Cortisol, which is secreted by the adrenal glands, is vital for regulating some physiological processes, including metabolism, immune response, and cardiovascular function. It is released in response to low blood glucose and stress. There is a regular pattern to the cortisol secretion; it rises in the morning and gradually falls during the day. Chronic stress-induced elevations in cortisol levels over time have been linked to several health issues, including anxiety, depression, and sleep disturbances. Cortisol has therefore been suggested as a potential stress and depression biomarker. [7]

The connection between cortisol levels and bruxism has been the subject of numerous researches. Individuals who have bruxism have repeatedly been found to have elevated cortisol levels, indicating a substantial role in stress and the body's reaction to stress in the development and aggravation of this disorder.

This paper deals with possible treatment strategies that focus on cortisol management as well as the function of cortisol in the etiology of bruxism.

OBJECTIVE

The aim of this work is to investigate the function of the stress hormone cortisol in the development and treatment of bruxism.

This study aimed to investigate the correlation between cortisol and psychological status (depression, anxiety, stress, including job-induced stress, and frustration).

MATERIALS AND METHODS

We used available resources from medical databases such as Pubmed and Google Scholar to create the work. In the first stage, we searched for articles on the issues we were interested in. Then we verified them regarding content, conflict of interest and research methodology. As a result, we received a set of 18 articles with the highest impact factors. We selected the latest, multi-environmental articles including meta-analysis. The paper is descriptive and focuses on systematizing the meta-analytical knowledge regarding bruxism etiology and treatment.

STRESS AND SLEEP BRUXISM

The Journal of Oral Rehabilitation released a study that looked at cortisol levels in people who had bruxism during sleep. The researchers discovered that elevated cortisol levels frequently preceded episodes of bruxism. There is a clear link between stress-induced hormonal changes and the occurrence of bruxism during sleep, suggesting that this nocturnal spike in cortisol may serve as a trigger for bruxism episodes. [9]

A study by Clark et al. (1980) measured the catecholamine levels in the urine of ten patients who did not have bruxism and twenty patients who did. The findings support the idea that emotional stress is one of the etiological components of bruxism and show a positive connection between bruxism and urine catecholamine levels. [12]

The most popular method of measuring an individual's stress level is to measure the amount of cortisol secreted by the hypothalamus, which was initially established by Pruessner et al. (1997). The results of this study indicating stress as an etiological factor for bruxism may be related to the level of salivary cortisol upon waking, which is linked to chronic stress. [13]

A cross-sectional study was carried out by Pontes and Prietsch (2019) on a sample of 1280 urban residents who were 18 years of age or older. The authors evaluated the frequency of sleep bruxism, its primary indications and symptoms, and the relationship between bruxism and psychological stress. 8.1% of the population was found to have sleep bruxism; of them, 70.3% experienced dental wear and 44.5% had pain in the muscles used for mastication. Additionally, there was a correlation between the malfunction and increased psychological stress. The scientists concluded that a significant number of people suffer from sleep bruxism, which can harm the stomatognathic system permanently. One significant study links psychological stress to an increased likelihood of this disorder. [14]

Sleep bruxism in youngsters appears to have a common etiology connected to age-related sleep disorders. A study of the literature, which included studies from 2007 to 2016, identified poor dietary habits, high media consumption, disturbed sleep, and emotional stress as the main risk factors for the development of bruxism in children and adolescents. This review demonstrated no statistically significant difference in salivary cortisol levels upon waking when the studied sample consisted of children, in contrast to the association reported between adult cortisol levels and bruxism. [15,16]

CORTISOL AND AWAKE BRUXISM

Studies looking into awake bruxism have revealed similar results. According to research that was published in the *Journal of Prosthetic Dentistry*, daytime cortisol levels were greater in awake bruxists than in controls. This lends credence to the theory that stress and its physiological indicators, including cortisol, are important factors in the development of awake bruxism. [10]

The area under the response curve (AURC) was determined by Castelo et al. (2012) by measuring salivary cortisol for 30 minutes and immediately after awakening. A Stepwise logistic regression model was used to confirm the relationship between bruxism, as the dependent variable, and age, sex, body mass index, heart rate, presence of sucking habits, nail biting, enuresis, and AURC ($\alpha = 0.05$). The data were analyzed using descriptive statistics, normality tests, and Spearman correlation tests. The findings indicated that there isn't enough data to support a link between stress and bruxism because children with bruxism have lower salivary cortisol levels than children without the condition. [17]

CORTISOL AS A THERAPEUTIC TARGET

Reducing cortisol levels through interventions may present a promising treatment option for bruxism given the proven correlation between the two conditions. Numerous tactics have been investigated, such as pharmacological therapies, lifestyle changes, and stress management methods.

It is imperative to acknowledge the correlation between stress and the etiology of bruxism in both adult and pediatric populations, as highlighted by Kato et al. (2001). The authors reaffirmed the great benefits of cognitive and behavioural therapy combined with lifestyle modifications. Furthermore, short-term prescription drugs and muscle relaxant plaques can be administered to protect teeth. [18]

STRESS MANAGEMENT TECHNIQUES

Stress-reduction methods including mindfulness, cognitive-behavioral therapy (CBT), and relaxation exercises have been proven to be effective in lowering cortisol levels and easing bruxism symptoms. Participants in randomized controlled research that was published in the *Journal of Clinical Psychology* showed a substantial decrease in the severity of their bruxism when they regularly practised stress management and mindfulness. [11]

PHARMACOLOGICAL INTERVENTIONS

Studies have also been conducted on pharmacological therapies that aim to regulate cortisol levels. Because they alter the stress response, beta-blockers and selective serotonin reuptake inhibitors (SSRIs) may be able to lower the frequency of bruxism. According to research published in the *Journal of Psychiatric Research*, SSRIs can lessen bouts of bruxism by lowering cortisol levels and lessening the stress response. [8]

LIFESTYLE MODIFICATIONS

A balanced diet, sufficient sleep, and frequent physical activity are among the lifestyle changes that can help control cortisol levels and lessen the incidence of bruxism.

CONCLUSION

The significance of tackling stress and its physiological effects is shown by the involvement of cortisol in the genesis and management of bruxism. High cortisol levels are a hallmark of bruxism and may also be a target for treatment, emphasizing the need for a comprehensive care strategy that includes lifestyle changes, medication, and stress-reduction methods. Aiming to control cortisol levels, specialized therapy may help those with bruxism achieve better results as research into the intricate relationship between stress hormones and the disorder progresses.

Clinicians can more effectively customize treatments to lower stress and its physiological effects by knowing the intricate role that cortisol plays in bruxism. This will eventually improve patient outcomes and quality of life.

AUTHOR CONTRIBUTIONS

MP, KW: conceptualization, literature review, writing - original draft preparation; MP, KW, PB, GŁ, MA, JR: literature review, writing - review and editing.

All authors have read and agreed to the published version of the manuscript.

FUNDING

This research received no external funding.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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