

Occlusal Splint Effectivity in Child Bruxism

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Abstract

Background: Bruxism is defined as a repetitive activity of the masticatory muscles characterized by teeth clenching or teeth grinding or by tapping and moving the jaw. Patients with bruxism may experience symptoms of jaw muscle pain or attrition of teeth. An occlusal splint is a removable appliance that is made in accordance with the occlusal and incisal surfaces of the teeth in one of the opposing jaw arches. The mechanism of the occlusal splint in reducing bruxism is muscle relaxation, to break the habit in patients with increasing intensity of bruxism and reduce the tooth wear.

Aim: The aim of writing this article is to find out the effectiveness of the use of occlusal splints in child bruxism cases.

Mini-Review: This Literature review was compiled by collecting, identifying, evaluating, and analyzing the journals PubMed, Wiley, Science Direct, and manual searches during the publication time period 2011 to 2021 regarding the effectiveness of using an occlusal splint to treat cases of bruxism in children. From 261 journal articles obtained in the initial search, 6 full-text journals were found that met the criteria and were carried out.

Conclusion: The occlusal splint is effective to overcome cases of bruxism in children.

Keywords: Bruxism; Child; Occlusal splint

Introduction

Bruxism is defined as the oral parafunctional activity, characterized by occlusal contact resulting from repetitive, involuntary, and non-nutritive motor activity [1-4]. It is a repetitive activity of the muscles of mastication characterized by teeth clenching or teeth grinding or by tapping and swaying the jaw [5,6]. The etiology of bruxism is multifactorial [8]. includes central, local and genetic causes

tapping and swaying the jaw [5,6]. According to the American Academy of Sleep Medicine, the diagnosis of sleep bruxism is based on reports of teeth grinding combined with one of the symptoms of abnormal tooth wear, noise associated with bruxism, and jaw muscle discomfort [5-7].

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[9]. Central causes are stress and anxiety, neurological factors such as the pathophysiology of the central and autonomic nervous systems. Local factors in the form of malocclusion, oral dysfunction, posture, airway disorders such as obstructive sleep apnea (OSA), allergies, adenoid enlargement [10].

The prevalence of sleep bruxism in adults is 10-16%, in children 3.5-40.6% [11]. Other studies show a prevalence for adults of 20% and children of 19-40% [9].

Treatment of bruxism is influenced by the cause of the bruxism. Pharmacological, psychological, and dental approaches can be alternative treatments [12]. For this purpose, drugs (benzodiazepines, anticonvulsants, beta-blockers, dopamine agents, antidepressants, muscle relaxants) may be given [13,14]. Psychological therapy includes behavioral therapy, relaxation to control stress, psychotherapy, hypnosis can be treatment options [15]. Treatment of teeth can be done with reversible and irreversible appliances. Reversible appliances such as occlusal splints, irreversible appliances, such as occlusal adjustments, dental restorations, and the use of fixed orthodontic appliances [16].

The purpose of writing this literature review is to determine the effectiveness of using an occlusal splint to treat cases of bruxism in children.

Method

Data source

Data collection was carried out by searching and analyzing literature from the electronic data site PubMed, Wiley Online Library, Science Direct, and manual searches on the publication time range from 2011 to 2021.

Systematic data search using the keywords bruxism and children or occlusal splint.

Search Criteria

Inclusion criteria for articles published in the time span between 2011-2021, available online and already published, and related to the usage of occlusal splints for treatment of bruxism in children.

A. Inclusion Criteria

- Articles published from 2011-2021
- Articles available online and published
- Articles related to bruxism, child and occlusal splint

B. Exclusion criteria

- Articles under 2011
- Inaccessible article

Search Method

- PubMed
- Science Direct
- Wiley online library
- Manual/hand search

Search Details

Keywords: "bruxism" and "children" "occlusal splint".

Data Collection and Data Analysis

The author takes articles through an electronic database according to keywords. The articles taken are articles from the last 10 years (2011-2021). The articles obtained were 261. The author assessed the title and abstract of the research generated from the search and obtained as many as 50 articles. The authors assessed the full-text articles to determine that the studies met the inclusion criteria. Get 6 articles according to

the inclusion criteria. The studies that met the inclusion criteria then underwent

quality assessment and data extraction. Furthermore, the data obtained as follows:

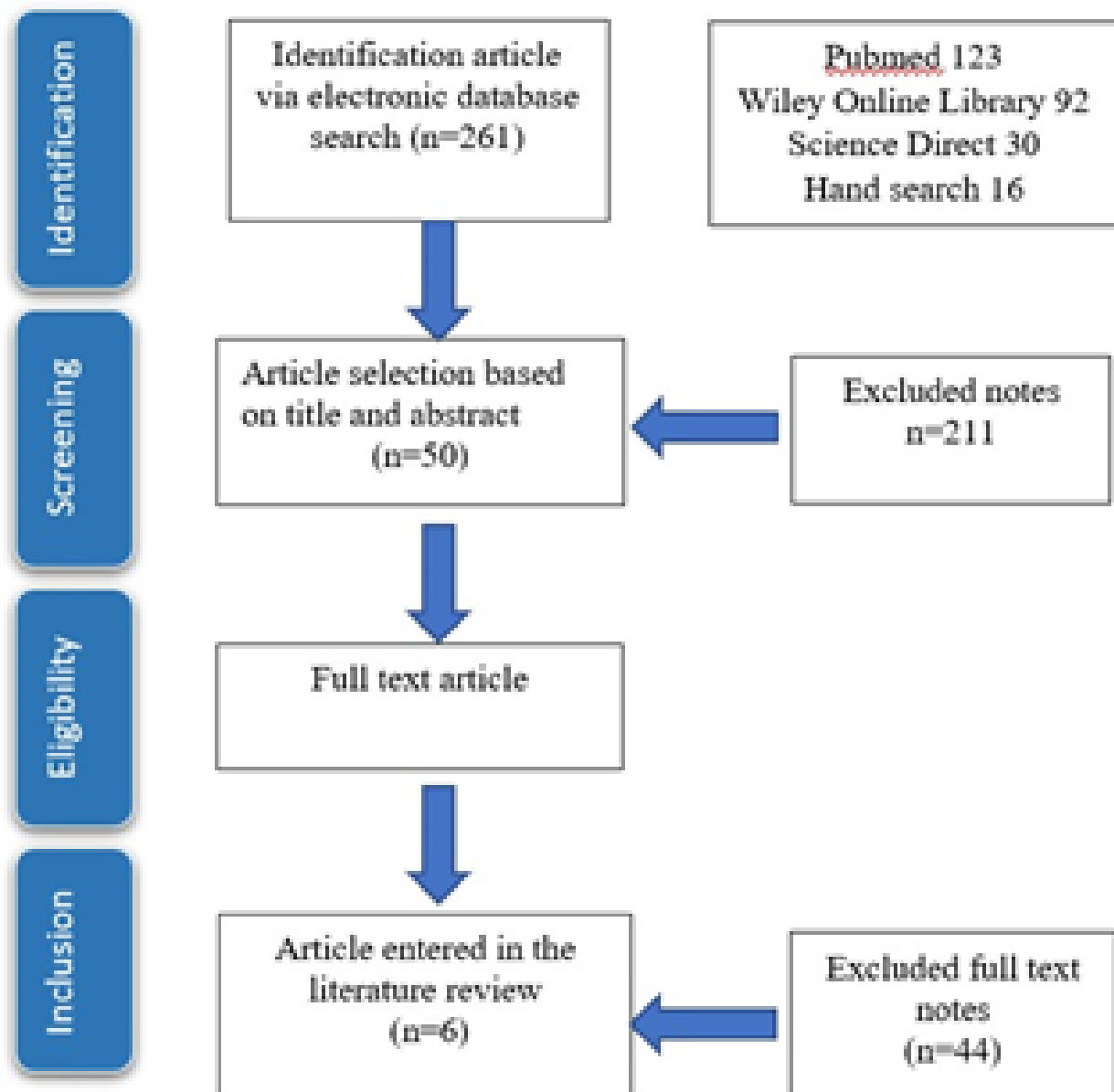


Figure 1: Screening Chart.

No	Year	Writer	Title	Purpose	Method	Results
1	2011	Claudia C. Rstrepo, Isabel Medina, Isabel Patiño	Effect of Occlusal Splints on the Temporomandibular Disorders, Dental Wear and Anxiety of Bruxism children, volume, year, publish	To see how effective biting sprints are at reducing the signs and symptoms of temporomandibular disorders (TMD), as well as anxiety in children with TMD and tooth wear	Randomized clinical trial	The use of a stiff occlusal plate did not lessen the overall indications of bruxism, although it did lower the open mouth deviation.
2	2012	Lilian Chrystiane Giannasi, Israel Reis Santos, Thays Almeida Alfaya, Sandra Kalil Bussadori, Luis Vicente Franco de Oiveira	Effect of an occlusal splint on sleep bruxism in children in a pilot study with a short-term follow-up	The purpose of the present study a short-term follow up was to evaluate the effect of the use of an occlusal splint in children with bruxism in a pilot study	Randomized controlled trial	The use of an occlusal splint had a positive effect on sleep bruxism and other sleep problems
3	2013	Oliveira Marcelo Tomás, Bressan Talita, Pamato Sauolo, et al.	Bruxism in children: Effectiveness of bite splints	The purpose of this study was to evaluate the effectiveness of bite splints in the treatment of children with bruxism reduction or elimination of symptoms and effective use of the dental appliance	Randomized controlled trial	There was a significant reduction in parafunctional activity headache and muscular discomfort with the use of bite splints. The higher the persistence of patients, the higher the use rate of bite splints

4	2017	Meutia Dienda Citrawuni, Vidya Carolyn Tjokrosetio, Eva Fauziah	Management of sleep Bruxism in Children	The goal of this paper is to describe two cases of sleep bruxism in children with diverse medical histories, as well as to analyze aspects that may contribute to their persistence.	Case report	To safeguard the unaffected teeth and relax the masticatory muscles, occlusal splints were performed.
5	2019	Luiz Alexandre Chisin, Alissa Schmidt San Martin, Mariana Gonzales Cademartori, Noeli Boscato, Marcos Britto Correa, Marilia Leão Goettem	interventions to reduce bruxism in children and adolescents: a systematic scoping review and critical reflection	to perform a critical reflection about intervention options for bruxism reduction in children and adolescents	Systematic review	Occlusal splints have been proven to reduce self-reported bruxism and the RMMA index, which is reflected in a decrease in headaches, validating the findings in adults.
6	2020	Monica da Consolacao, Fernanda Yukie Kobayashi, Lara Jansiski Motta, et al.	Effect of Photobiomodulation on Salivary Cortisol, Masticatory Muscle Strength, and clinical Signs in children with sleep Bruxism: A Randomized Controlled trial	Determining the appearance of buccal mucosal bites in children is a complementary sign for the diagnosis of SB and studying the effectiveness of photobiomodulation as an alternative treatment for this condition.	Randomized controlled trial	The frequency of children with a headache before and after treatment with G1 (p=0.0005) and G2 (p=0.0001) was statistically significant. G4+C6:G7+C5:G7+G4+C6:G7+C4:G7+C5:G7

Table 1: Synthesis table.

Literature review

Bruxism is defined as repetitive masticatory muscle activity characterized by clenching and grinding of teeth and/or tapping and jaw swaying [17,18].

Bruxism is classified into 2, namely sleep bruxism (SB) and awake bruxism (AB). Sleep bruxism is often found in children and adolescents with a prevalence ranging from 3.5-40.6% [11-19]. Sleep bruxism can be found in the first year when the incisors erupt. The frequency will increase with age until it reaches a peak around the age of 10-14 years [20].

Other literature states that the prevalence of sleep bruxism ranges from 6 to 50% in children [21]. The variability of the diagnostic criteria also contributes to the prevalence rates obtained. The noninstrumental approach and the instrumental approach (electromyography and polysomnography) used to assess bruxism will also affect the prevalence of bruxism [22].

Patients with sleep bruxism may experience symptoms of jaw muscle pain (masseter, temporalis, medial and lateral pterygoid), temporomandibular disorders, morning pain, and headache [23]. In addition, clinical signs such as tooth wear, muscle hypertrophy, and clicking on the TMJ can also be found in cases of bruxism [24].

The multifactorial etiology of bruxism is associated with the immaturity of the masticatory system, although biological and psychological factors are also strongly associated with the development of bruxism [25]. On the other hand, bruxism in children and adolescents can also be considered a physiological behavior because the growth of the facial skeleton requires muscle

activity [26]. The boundary between physiological and non-physiological bruxism and the form of assessment of bruxism is the main assessment factors that influence the prevalence rate [27].

Therapy to reduce sleep bruxism aims to eliminate the cause of bruxism, change the behavior that causes bruxism, and improve the complications that result from bruxism [28].

Occlusal splint

An occlusal splint can be used to overcome wear and tear due to cases of bruxism [29]. An occlusal splint is considered the first line to prevent noise bruxism and tooth wear in cases of sleep bruxism. An occlusal splint is also known as a bite guard, bruxism appliance, bite plate, night guard, and also occlusal device. Occlusal splints are classified into 2, namely hard splints and soft splints [30].

The design of the occlusal splint is tailored to the severity of bruxism. Soft bite splints are ideal for patients with mild bruxism. The Occlusal Splint Laminate Hybrid (hard on the outside and soft on the inside) is ideal for moderate bruxism. Hard acrylic bite splint is adapted for severe bruxism [31,32].

Physiological aspects of occlusal splint mechanism

The occlusal splint is effective at spreading this pressure throughout the jaw and creating a physical barrier between the upper and lower teeth [33].

According to Solberg et al, the occlusal splint reduces muscle activity and provides greater patient comfort. The use of an occlusal splint appears to reduce teeth grinding, masticatory muscles, and orofacial pain [34].

The most popular theory regarding the mechanism of action of 'oral splints' in dentistry is that occlusal splints are effective because they reduce the number of teeth in contact, and convert periodontal proprioceptive stimuli to the central nervous system [35].

According to the cognitive theory of consciousness. The presence of a splint as a foreign body in the mouth is expected to change the tactile stimulation, and reduce the volume of the oral cavity and the space for the tongue to be swallowed. causes the patient to become aware of the position and use of the jaw as potentially damaging [36].



Figure 2: Occlusal splint [32].

Sleep problems (n = 9)	Prior to treatment (%)	After 90 days with OS (%)
Grinding sounds	Yes (100%)	Yes (11.0%); No (89.0%)
Snoring	Yes (100%)	Yes (44.5%); No (55.5%)
Headache	Yes (100%)	Yes (11.0%); No (89.0%)
Sleep movement	Yes (100%)	Yes (11.0%); No (89.0%)
Open mouth during sleep	Yes (100%)	Yes (0.0%); No (100.0%)

Figure 3: Sleep problems were assessed by questionnaire before and after 90 days of occlusal splint usage [32].

Discussion

This literature review was created to discuss the effectiveness of the occlusal splint in the treatment of cases of bruxism in children. The data obtained are the results of a randomized control trial, case reports, and systematic reviews.

Bruxism Long-term untreated can cause tooth enamel attrition, dentin, and exposure to the pulp area which can cause severe pain.

The scientific literature does not fully understand the relationship between bruxism strength, frequency, and tooth structural damage, but it is critical to decide the best time to treat bruxism cases [31].

Bruxism management goals include reducing bruxism activity, protecting and recovering teeth, reducing pain symptoms, and preventing the destruction of the temporomandibular joint and periodontal structure [31].

Studies on the use of occlusal splints to treat TMD with bruxism in children have been carried out by Restrepo et al. (2011) and Robin (2013). Restrepo et al. reported that the use of a rigid occlusal splint is not efficient for treating bruxism, but can reduce deviation when opening the mouth.

The Randomized Control Trial study was conducted by Lilian Chrystianne Giannasi et al. on 17 children, 9 of whom had sleep bruxism, consisting of 5 girls and 4 boys with an age range of 6-8 years. The nine children with bruxism wore an occlusal splint during the night. After 90 days of using the occlusal splint, 8 children did not show teeth grinding. And another child showed a decrease in the sound of teeth grinding. Snoring did not occur in 5 children and was rare in 4 other children.

While the mouth opened during sleep did not occur in 8 children. No headache occurred in 9 children after 90 days of occlusal splint use.

In the case report, two children had a history of bruxism during sleep, and one of the patients was a 5-year-old boy. A history of bruxism occurred 1 year ago, with the condition of the child being prone to anxiety. The child did not receive any previous dental treatment, the patient was in the primary dentition stage, there was no malocclusion, no limitation of mouth opening, and no TMJ dysfunction. There is wear and tear on the teeth, without pain. On the mandibular arch, the patient was given a hard-soft splint with a thickness of 1.8 mm to wear at night. Every two months, checks are performed. The patient's mother claimed that she no longer grinds her teeth at night.

A systematic review with the title "Interventions to reduce bruxism in children and adolescents: a systematic scoping review and critical reflection" stated that the use of occlusal splints correlated with the reduction of bruxism. Self-reported bruxism by parents was reduced by 76.7%. From this systematic review, it can be concluded that the occlusal splint has shown a potential to reduce bruxism self-reported and from a decrease in the RMMA (Rhythmic Masticatory Muscle Activity) index which reflects a reduction in headaches. The mechanism of the occlusal splint in reducing bruxism is associated with reduced muscle activity, as well as preventing tooth wear by protecting the teeth [22].

The journal "Effect of Photobiomodulation on Salivary Cortisol, Masticatory Muscle Strength, and Clinical Signs in Children with Sleep Bruxism: A Randomized

Controlled Trial" showed a statistically significant difference between the frequency of children with headaches before and after treatment with photobiomodulation and also treatment with an occlusal splint. But there was no significant difference between treatment with photobiomodulation and occlusal splint. Headaches, such as migraines and tension headaches, are very common symptoms of stress associated with bruxism.

In this study, increased salivary cortisol levels were found in all groups after treatment. This is probably because salivary cortisol is an indication of an acute response to a stressor. Meanwhile, hair cortisol reflects cumulative exposure to stress. While bruxism is a chronic condition, where

the patient is exposed to stressors for a certain period of time. So, it is better to check hair cortisol than salivary cortisol.

In a systematic review entitled "The efficacy of occlusal splints in the treatment of bruxism: A systematic review", it is stated that studies on occlusal splint therapy compared to no treatment gave mixed results without a statistically significant effect on preventing the development of tooth wear in children. With sleep bruxism, there is a suggestion that patients with high activity bruxism can reduce the intensity of bruxism.

The use of an occlusal splint for the treatment of bruxism cases can significantly reduce the symptoms of bruxism.

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