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# **Management of idiopathic sleep bruxism in children and adolescents: a systematic review of the literature**

Short title: Sleep bruxism management in children

Estelle Casazza<sup>a,b,c,\*</sup>, Anne Giraudeau<sup>a,b</sup>, Audric Payet<sup>d</sup>, Jean-Daniel Orthlieb<sup>a,b</sup>, Ariane  
Camoin<sup>a,b,c</sup>

<sup>a</sup>: Aix-Marseille University, School of Dentistry, 27 boulevard Jean Moulin, 13385 Marseille, France.

<sup>b</sup>: Assistance Publique-Hôpitaux de Marseille (APHM), la Timone Hospital, 264 rue Saint Pierre, 13385 Marseille, France. France

<sup>c</sup>: Aix Marseille Université, CNRS, EFS, ADES UMR 7268, 13344, Marseille, France.

<sup>d</sup>: 1, rue Granoux 13004 Marseille

\*Corresponding author: mobile: +33678371907 [estelle.casazza@univ-amu.fr](mailto:estelle.casazza@univ-amu.fr)

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## **Abstract**

Aim: Primary sleep bruxism (SB) affects between 6 and 30% of children and adolescents. Its frequency increases with age, reaching a peak at 10–14 years of age, after which it drops until adulthood. The treatment of SB has not been extensively documented, resulting in a lack of reference points and legitimate concerns for dentists in their everyday practice. The aim of

this literature review was to summarize the available evidence on the management of SB in children and adolescents and the efficacy of the different approaches.

Method: A systematic literature search was conducted according to PRISMA guidelines from January 2006 to June 2019 using the PubMed, The Cochrane Library, ScienceDirect, and Google Scholar databases. All types of SB treatment were accepted. Eight studies were selected for their protocol quality, according to the PICOS tool.

Results: Several treatment methods were assessed from the eight clinical studies selected, such as occlusal splint, palatal expansion, and pharmacological treatment. Assessment of the treatment methods was difficult because only eight studies were selected, and both the treatment methods and the study protocols used were different. The therapeutic strategies found in the literature were based on the general condition of the case. Treatment approaches were distinguished into treatments for isolated SB and those for SB associated with ventilatory disorders.

Conclusion: The current study shows the need to define diagnostic criteria adapted to SB in children in order to improve epidemiological surveys and subsequently clinical practice. To overcome the difficulties related to SB diagnostic criteria, a multidisciplinary approach, involving pediatricians, otorhinolaryngologists, and dental practitioners, is essential for a better management and follow-up of young patients. A case-by-case approach, taking into account the specificities of each young patient, seems the most appropriate management today.

**Keywords:** adolescents; children; sleep bruxism; treatment.

## 1. Introduction

Bruxism is defined as an oral habit characterized by occlusal contacts resulting from non-nutritive, repeated, involuntary, and most often unconscious motor activities of the manducatory apparatus. Different types of bruxism can be distinguished, with clenching, lateral movements, grinding, and tapping of the teeth. Bruxism has two circadian manifestations: it can occur during sleep (consequently referred to as “sleep bruxism”), or when awake (referred to as “awake bruxism”) [1, 2].

In 2018, an international group of experts updated the definition of sleep bruxism (SB) as being “a masticatory muscle activity during sleep that is characterized as rhythmic (phasic) or non-rhythmic (tonic) and is not a movement disorder or a sleep disorder in otherwise healthy individuals,” thus differentiating it from awake bruxism [3]. SB is thought to be more prevalent in children than in adults [4]: It is thought to affect between 6 and 30% of children [4, 5]. SB can appear in the first year of life during the eruption of the primary teeth, but it generally begins with stable primary teeth [6]. Its frequency increases with age, reaching a peak between 10 and 14 years, after which it drops until adulthood [2]. The prevalence of SB does not differ on the basis of gender [4, 6]. In fact, although SB was previously considered as a parafunctional activity, meaning that bruxism equates to a collection of coordinated activities not contributing to a functional purpose, today it appears that the definition is more in line with a biological continuum ranging from physiological function to pathological function [2]. Consequently, among individuals in good health, bruxism is no longer considered a pathology in itself, but rather as a behavior that can represent a risk factor or a protective factor, with certain clinical impacts on oral health [3]. Thus, it seems that a physiological bruxism exists, in particular among children, given its role in the maintenance

of tissue homeostasis, in stress management, and in alveolar growth [7, 8]. It consequently appears that it is excessive bruxism that can be considered pathological. It is therefore important to manage excessive bruxism and physiological bruxism in the presence of fragile structures (**Figure 1**).

However, in the presence of other clinical conditions, further assessment is recommended. In special cases, SB can be the warning sign of an underlying pathology: ventilatory disorders, obstructive sleep apnea (OSA), chronic allergies, and major anxiety [9] (**Figures 2a and 2b**). Therefore, the definition of bruxism is particularly complex, lying midway between parafunction and function, pathology and physiology.

One difficulty encountered when studying bruxism is the diagnostic method. Indeed, the diagnosis of bruxism requires further research to validate the following elements. The international consensus on the assessment of 2018 proposed that bruxism can be assessed using non-instrumental approaches, with self-report (questionnaires, oral history) and clinical inspection, or instrumental approaches, with electromyographic (EMG) recordings of masticatory muscle activity and polysomnography (PSG) [3]. A grading system has also been proposed [3] (**Table 1**).

Currently, the diagnosis of bruxism in children and adolescents rests on a combination of signs and symptoms. In addition, in current practice, it is not possible to propose instrumental assessment, with EMG or PSG, to all patients for whom bruxism is suspected: these assessment methods are instead reserved for cases of bruxism associated with sleep or ventilatory disorders [2].

Although the physiopathology of SB is better understood [10], there is very little in the literature dealing with treatment for children. There is a lack of reference points and there is legitimate concern on the part of practitioners. In daily practice, dentists are required to make

decisions on the most suitable approach for the management of bruxism. This implies that clinicians should be able to recognize whether or not management is needed in the first place.

The aim of this review was to summarize the available evidence on the management of SB in children and adolescents and to answer the following question: What do we currently know about the methods available for management of SB in children and adolescents and their efficacy?

## 2. Materials and method

### 2.1. Protocol and registration

A study protocol based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) was created. In addition, the reporting of the study was based on the PRISMA checklist. According to the Prospective Register of Systematic Reviews (PROSPERO), it was estimated that it was not necessary to register the studies.

### 2.2. Search strategy and literature selection

The systematic review of the literature was carried out in May 2020, with a view to identifying all articles likely to describe the treatment of SB in children.

#### **2.2.1 Inclusion and exclusion criteria**

Inclusion criteria comprised comparative or noncomparative, prospective or retrospective, longitudinal data related to the clinical treatment of bruxism in children.

The inclusion criteria for the paper review were:

- Articles published in English from January 2006 to December 2020

- Children and adolescent participants, with an age range of 1–18 years from both genders and with primary, mixed, and secondary dentitions

The diagnostic criteria of bruxism were:

- Patients' parents having reported teeth-grinding or teeth-clenching
- (and/or) Bruxism, confirmation by a dentist or practitioner using diagnostic criteria, such as tooth wear
- (and/or) Possibly, the use of polysomnography to confirm the clinical diagnosis
- All types of interventions aiming to reduce bruxism in children were accepted, whether they were pharmacological, psychological, physical, surgical, or therapeutic via occlusal splint

The exclusion criteria consisted of studies that failed to meet the inclusion criteria: studies of patients with systemic diseases, syndromes, or neurological or psychiatric disorders; studies of patients with temporomandibular disorders and motor disturbance; studies of patients with facial dysmorphia; lack of standardized measures for bruxism evaluation; lack of effective statistical analysis; case reports, abstracts, or editorials.

### **2.2.2 Search methods**

Four databases were used to search for studies for this review: PubMed, The Cochrane Library, ScienceDirect, and Google Scholar. A computerized search targeted articles published between January 2006 and December 2020. The terms used for the search were “bruxism” and “children,” entered into the search bars with the Boolean operator “AND.” We selected these keywords that reference very general concepts in order not to bias the results concerning the different possible treatments.

All search steps were carried out by a single author, and then carefully checked by all the other authors to minimize bias during the review process. In the case of disagreement, a decision was reached by consensus of the majority of the authors.

### **2.2.3 Quality assessment**

Due to the diversity of study protocols and of SB treatments suggested by the authors, it was not possible to compare quantitatively the effectiveness of the different methods. A qualitative analysis of the protocols is proposed in this literature review, using the PICOS tool (Population, Intervention, Comparison, Outcome, Study type) [11].

The qualitative analysis of results was performed based on: (1) the diagnostic accuracy of bruxism assessment tools, of which measures of sensitivity and specificity were considered; (2) the effectiveness of interventions through relative or absolute frequencies, standardized or weighted mean differences, RR and qualitative data (follow-up period, qualitative evaluation of results, positive effects of the treatment, effectiveness, reproducibility, side effects), and compliance with ethical standards.

### **2.2.4 Data recorded from the selected studies**

For each study included, the following information was recorded: size of the sample, type of SB management, diagnostic method of SB, follow-up periods, bias evaluation, and results.

## **3. Results**

### **3.1. Study selection**

Out of 13,645 articles initially selected from the four databases, a total of eight articles meeting the inclusion criteria were chosen for this study (**Figure 3**).

The selection method, conducted in a triple-blind manner, proved to be reproducible.



### **3.1.1 Quality assessment**

A quality assessment of the remaining eight papers revealed some differences in the strategy adopted to diagnose SB. A diagnosis of SB was proxy-reported by the parents or the guardians in seven studies [12–18], and one study assessed the presence of SB based on EMG [19]. These differences in SB diagnosis in the eight studies could be considered to represent an important bias. Most studies are based on proxy parental report of dental grinding, which was probably insufficient to diagnose all cases of SB but it was an easy way for the researchers to collect data. Also, a definition of SB severity was lacking in the studies. The remaining studies showed several kinds of bias, such as small samples or a short study period, for instance (**Table 2**).

### **3.1.2 Sleep bruxism treatment data**

The articles included in the final step of the review covered a wide geographical area, including South America (Brazil,  $n=4$  studies, Colombia,  $n=1$ ), North America (Canada,  $n=1$ ), and Asia (Iran,  $n=2$ ). In total, they accounted for more than 300 individuals aged 2–17 years. The strategies adopted to treat bruxism were different, and thus a direct comparison of treatment types and a meta-analysis of the study data could not be made.

Using the PICOS tool, it appeared that five studies described randomized clinical trials [12, 14, 16–18], and three were cohort studies [13, 15, 19].

Three studies reviewed the use of occlusal splints to treat SB [12, 13, 15]: In their clinical trial, Restrepo et al. reported no significant statistical difference between the experimental group and the control group [12]. However, the two other studies, which were cohort studies with low sampling, concluded that wearing an occlusal splint reduced the occurrence of SB in children [13, 15].

One study [19] reviewed the effect of rapid palatal expansion on SB. This was also a cohort study, which observed a decrease in the rate of SB in 65% of the study participants.

A pharmacological approach was assessed in two studies, with two different anxiolytic treatments. Ghanizadeh et al. studied the effects of hydroxyzine in a clinical trial, and showed a significant difference between groups [14]. However, Mostafavi et al., who studied the effects of diazepam, did not find any differences [18].

Finally, two studies investigated alternative treatments with homeopathy in two clinical trials. The first one did not show any significant difference [16], but in the second study the authors observed a decrease in SB among patients [17]. (**Tables 2 and 3**)

#### **4. Discussion**

In recent years, the diagnosis and treatment of idiopathic SB in children and adolescents have received increasing interest due to its presence in diverse medical fields, such as dentistry [20, 21] but also pediatrics and otorhinolaryngology, for instance [22].

Currently, no consensus has been reached regarding the diagnosis of SB in children. In the majority of cases, a diagnosis of bruxism was made following the observation of dental wear or patient anxiety. But as these signs were not specific to bruxism, they led to many false-positive and false-negative diagnoses. PSG was thought to be a reliable tool, but only during the active phases of bruxism. Parents can report episodes of teeth grinding during sleep, thus influencing the diagnosis. This indication, however, implies that the parents are close to the child during the night, which is rarely the case. Moreover, clenching is completely silent. Thus, the diagnosis of SB has been based on several elements: interviewing the parents, medical antecedents, extraoral and intraoral examination, and in certain cases, currently very few, EMG recording or PSG. This absence of clearly established guidelines was reflected in the diversity of diagnostic methods, combined or not, described the eight studies selected:

interviewing the parents, who were asked (or not asked) to sleep near the child, a clinical examination made by a dentist, and, on only one occasion, an EMG. Yet, a variable diagnostic approach between studies led to the establishment of groups of patients whose characteristics are not always comparable with each other. The results of the treatments evaluated must be considered with caution, as each study presented its own diagnostic method. Thus, this absence of consensus in the diagnosis explains the diversity of approaches that were proposed and investigated.

Four types of treatment for SB in children were the subject of the eight studies performed during the last decade and selected for this review:

- Treatment by occlusal splint [12, 13, 15]
- Orthopedic treatment [19]
- Pharmacological treatment [14, 18]
- Alternative treatment: homeopathy [16, 17]

The therapeutic strategies found in the literature depended on the general condition of the child. Thus, we distinguish between treatments for isolated SB and those for SB associated with ventilatory disorders.

#### **4.1. Management of isolated SB**

##### **4.1.1. Treatment by occlusal splint**

During the past 10 years, three articles addressing the subject of bruxism in children, free of other pathologies and neurological syndromes, studied treatment by occlusal splint.

The aim of these articles was to demonstrate that the use of an occlusal splint was effective in reducing bruxism in children. In 2011, the study by Restrepo et al. [12] demonstrated that the treatment of bruxism by occlusal splint was not sufficiently effective. These were in fact

small-scale short-term studies. Moreover, the results of these studies were based on the reports of parents, which led to additional bias and unreliable diagnoses. In 2012, Giannasi et al. [13] reported a reduction, or even an absence, of SB in the majority of patients studied. The most recent study, dated 2014, by Oliveira et al. [15], was the only one to have taken growth into account. For this, children were regularly examined and the splints were modified using palatal expansion. Their results showed that the use of an occlusal splint reduced muscle discomfort, decreased the frequency of headaches, and reduced bruxism. It was then deduced that the occlusal splint did not eliminate bruxism, as many studies have demonstrated with adults [23]. Its use had only a temporary effect in controlling bruxism, but it played an essential role in the protection of dental structures.

This study did not take into account the possible consequences of such a splint for the growth and eruption of the permanent teeth. New studies on a larger scale, which are more long term and take into account these factors, should be conducted. In their study, Oliveira et al. highlighted the problem of compliance related to forgetfulness, to the discomfort caused by the splint, and to the cessation of its use once grinding noises had ended [15].

#### **4.1.2. Pharmacological treatments**

Since bruxism is considered to be the result of the combination of several factors, frequently including anxiety and stress [24], several drug-based approaches have been proposed to reduce these manifestations of anxiety. Thus, the treatment of bruxism has followed two different routes in the past 10 years.

First, the use of anxiolytics, such as hydroxyzine [14] and diazepam [18], was studied. Hydroxyzine has been the subject of several studies, because of its sedative effect and its effect on minor anxiety symptoms. In 2013, a study by Ghanizadeh et al. [14] showed a significant reduction in bruxism in children in the hydroxyzine group versus the placebo group. This study was a short-term study with a small sample. Moreover, the results also

showed a reduction in bruxism in the placebo group. Finally, although reported as low and minor by the authors, undesirable effects were noted: decreased appetite, confusion, insomnia, and headaches. The properties of hydroxyzine highlighted in the study were: deeper sleep, decreased anxiety, and muscular relaxation. Thus, the authors concluded that treating the comorbidities of bruxism treats bruxism and that hydroxyzine reduced SB as reported by the parents. On the other hand, in their study published in 2019, Mostafavi et al. [18] concluded that there was an absence of significant results on the effectiveness of the short-term use of another anxiolytic, diazepam, on SB.

#### **4.1.3. Alternative treatment**

A second type of treatment was studied more recently: the use of homeopathy. However, studies did not show any effectiveness of homeopathy in managing bruxism.

#### **4.1.4. Additional tracks**

Other kinds of management were proposed by different authors, but these were not selected because the studies did not meet the inclusion criteria for this literature review; however, they appear to be interesting fields for exploration.

- Some publications favored a non-drug-based approach, with hygiene and dietary advice: avoidance of soft drinks, on the grounds that the latter created erosion factors that aggravated dental wear; avoidance of chewing gum as movements of the masticatory muscles can generate a reflex reproduced at night [25, 26]. It is also appropriate to inform the parents about relaxation techniques and sleep hygiene [27]. Children were advised to have at least one nap per day and not to look at screens before going to bed [2, 28, 29].
- Other publications described the value of using cognitive-behavioral therapy with directed muscular relaxation and a change in the behaviors of parents and teachers, which are at the root of anxious reactions among children. At the same time, a

technique of directed muscular relaxation, the aim of which is to teach the child to recognize the muscular states of tension and relaxation, was applied. Children's anxiety levels dropped by more than 65% and the reduction in bruxism was significant [26, 30].

- A “proprioceptive” approach was also evaluated. This consisted in a modification of bruxism behaviors using composite resin bonding. New proprioceptive information was said to reduce and reorient parafunctional manducatory activity [2]. The purpose of this bonding was to modify proprioception and, consequently, reflex pathways. To date, this approach has only been described for adult patients [31].
- Finally, brand new areas of investigation are to be the subject of clinical trials, such as infrared LED (light-emitting diode) therapies [32].

## **4.2. Management of SB associated with ventilatory disorders**

### **4.2.1. Orthopedic treatments**

In 2015, in an observational clinical trial, Bellerive et al. studied the consequence of rapid palatal expansion for bruxism in children [19]. This was an orthopedic treatment based on maxillary expansion aiming to correct transverse bone deficiencies and respiratory sleep disorders.

In this study, bruxism was evaluated on the basis of rhythmic masticatory muscle activity (RMMA). Of the 32 patients included in the study, 65% experienced a reduction in their episodes of RMMA after expansion. The evaluations of RMMA episodes were carried out on three occasions and this was the only study that used PSG. However, the study sample was small, and a more long-term follow-up was necessary to determine whether this type of treatment could be proposed. Moreover, just as with treatment for adenotonsillectomy, this treatment was targeted at children who had a prior maxillary transverse growth deficiency of

at least 5 mm and was therefore in no case generalizable. The treatment was indicated in cases of a narrow maxilla with associated ventilatory disorders.

#### **4.2.2. Surgical approach**

Other kinds of SB management were proposed by various authors but these were not selected, as they did not meet the inclusion criteria for this literature review; however, they appeared to be interesting avenues for exploration.

A previous systematic review by Restrepo et al. [33] included the treatment of SB via widening of the upper airway through adenoidectomy. This surgical approach was proposed for children presenting with tonsillar and adenoid hypertrophy associated with excessive bruxism and OSA. It was suggested that bruxism in children presenting with obstruction of the upper airways could be significantly reduced after an adenotonsillectomy [34].

Thus, it appears essential to approach the management of SB in children and adolescents in a multidisciplinary way. Indeed, a ventilatory disorder can be detected by a pediatrician, a dentist, or an orthodontist, but can only be confirmed after a specific examination by an otorhinolaryngologist. Therefore, a multidisciplinary approach is desirable for the appropriate management of young patients.

### **5. Conclusion**

The present systematic review summarized the available evidence on the management of SB in children and adolescents and the efficacy of the different approaches. Eight studies were included in the final data analysis. These studies described four types of treatment (relaxation splint, palatal expansion, pharmacological, and homeopathic approaches) evaluated with different methodologies.

Clinically speaking, and with the current level of knowledge, splints are difficult to use during growth; however,, several other approaches, such as cognitive-behavioral therapy or the

proprioceptive approach, would benefit from further investigation [20, 32]. A case-by-case approach, taking into account the specificities presented by each young patient, seems to be the most appropriate management to propose. Indeed, it would enable a targeted response adapted to the SB-related parameters. Thus, a decision tree can be proposed to help orient the patient's management according to the individual specificities (**Figure 4**).

On the other hand, the main problem identified for all the studies was the very low specificity of the bruxism diagnosis, which questions the validity of each individual investigation. The current study showed, as with any therapeutic treatment, the importance of diagnostic accuracy and therefore the need to define the diagnostic criteria relevant to SB in children in order to improve epidemiological surveys. Thus, to overcome these difficulties related to SB diagnostic criteria, a multidisciplinary approach, involving pediatricians, otorhinolaryngologists, and dental practitioners, is essential today to improve the management and follow-up of young patients.



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## Tables

Table 1: Grading system for assessment of bruxism

<b>Methods used for assessment of sleep bruxism</b>	<b>Presence of sleep bruxism</b>
Positive self-report only	<i>Possible</i>
Positive clinical inspection, with or without a positive self-report	<i>Probable</i>
Positive instrumental assessment, with or without a positive self-report and/or a positive clinical inspection	<i>Definite</i>

Table 2: Qualitative assessment of the included articles: features of studies and bias evaluation

Studies selected (n=8)	Size of study	Follow-up period	Diagnosis of sleep bruxism	Evaluation of bias risk
Restrepo et al., 2011, Effect of occlusal splints on the TMD, dental wear and anxiety in children with bruxism [12]	36 patients	2 years	Interview of children's parents Diagnosis of sleep bruxism	Values used for sample calculation from studies on adult bruxism Small sample Results reported by parents Severity of bruxism not assessed
Giannasi et al., 2013, Effect of an occlusal splint on sleep bruxism in children in a pilot study with a short-term follow-up [13]	9 children	90 days	Clinical examination by a dentist Interview of children's parents	Small sample Short-term study Results reported by parents No control group: similar to 9 case reports Severity of bruxism not assessed
Ghanizadeh et al., 2013, A preliminary randomized double-blind placebo-controlled clinical trial of hydroxyzine for treating sleep bruxism in children [14]	30 children	4 weeks	Sleep bruxism is diagnosed in accordance with the classification criteria suggested by the American Academy of Sleep Medicine (AASM) Parents' report	Small sample Sample bias Short-term study Severity of bruxism not assessed Results reported by parents
Oliveira et al., 2014, Bruxism in children: effectiveness of bite splints [15]	30 children	12 months	Diagnostic criteria of bruxism not detailed	Small sample Short-term study No control group Cohort study Severity of bruxism not assessed
Bellerive et al., 2015, The effect of rapid palatal expansion on sleep bruxism in children [19]	32 patients	At least 12 months	Criteria established in adults by Lavigne adapted for the pediatric population, based on a sleep electromyography	Small sample Short-term study No control group Cohort study Severity of bruxism not assessed
Bortoletto et al., 2016, Evaluation of electromyographic signals in children with bruxism before and after therapy with <i>Melissa Officinalis L</i> – a randomized controlled clinical trial [16]	24 children	At 30 days	Criteria established by the American Academy of Sleep Medicine: parents'/guardians' report of the occurrence of teeth clenching and/or grinding and incisal and/or occlusal tooth wear.	Small sample Short-term study Severity of bruxism not assessed
Tavares-Silva et al., 2019, Homeopathic medicine of <i>Melissa officinalis</i> combined or not with <i>Phytolacca decandra</i> in the treatment of possible sleep bruxism in children: A crossover randomized triple-blinded controlled clinical trial [17]	52 children	180 days	Bruxism reported by their parents/guardians	Small sample Short-term study Results reported by parents No control group but placebo group Severity of bruxism not assessed
Mostafavi et al., 2019, The efficacy of low and moderate dosage of diazepam on sleep bruxism in children: A randomized placebo-controlled clinical trial [18]	109 children	2 weeks	Bruxism reported by their parents/guardians	Small sample Short-term study Results reported by parents

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8 Studies selected	PICOS	Evaluation of results, confidence interval
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Restrepo et al., 2011, Effect of occlusal splints on the TMD, dental wear and anxiety in children with bruxism [12]	(P) 3- to 6-year-old children with sleep bruxism (I) Use of rigid occlusal bite plates (C) Comparison with control group (O) To evaluate the effectiveness of occlusal splints in reducing sleep bruxism symptoms (S) Randomized clinical trial	No statistically significant difference between the two groups after treatment ( $p=0.078$ ) Proxy-reported results: reporting bias
Giannasi et al., 2013, Effect of an occlusal splint on sleep bruxism in children in a pilot study with a short-term follow-up [13]	(P) 3- to 8-year-old children with sleep bruxism (I) Use of occlusal bite plates (C) Comparison with control group (O) To evaluate the effectiveness of occlusal splints in reducing sleep bruxism symptoms (S) Cohort study	No confidence interval, no statistical analysis Sleep bruxism reduction is noted by authors Proxy-reported results: reporting bias
Ghanizadeh et al., 2013, A preliminary randomized double-blind placebo-controlled clinical trial of hydroxyzine for treating sleep bruxism in children [14]	(P) 4- to 17-year-old children with sleep bruxism (I) Intake of hydroxyzine at bedtime (C) Comparison with control group (O) To evaluate the effectiveness of hydroxyzine in treating sleep bruxism (S) Randomized clinical trial	Statistically significant difference between the two groups after treatment $p<0.02$
Oliveira et al., 2014, Bruxism in children: effectiveness of bite splints [15]	(P) 7- to 10-year-old children with sleep bruxism (I) Use of occlusal bite plates (C) No comparison with control group, (O) To evaluate the effectiveness of occlusal splints in reducing sleep bruxism symptoms (S) Cohort study	Statistically significant difference between the two groups after treatment $p=0.9961$ Proxy-reported results: reporting bias
Bellerive et al., 2015, The effect of rapid palatal expansion on sleep bruxism in children [19]	(P) 8- to 14-year-old children with sleep bruxism with an orthodontic treatment for a maxillary transverse deficiency (I) Use of hyrax appliances (C) Comparison with a control group (O) To evaluate the effectiveness of rapid palatal expansion in reducing sleep bruxism symptoms (S): Cohort study	Statistically significant difference between the two groups after treatment
Bortoletto et al., 2016, Evaluation of electromyographic signals in children with bruxism before and after therapy with <i>Melissa Officinalis L</i> – a randomized controlled clinical trial [16]	(P) 6- to 10-year-old children with sleep bruxism (I) Homeopathy: <i>Melissa officinalis L.</i> (C) Comparison with a control group (O) To evaluate the effectiveness of homeopathy in reducing sleep bruxism symptoms (S) Randomized clinical trial	No statistically significant difference between the groups after treatment $p<0.05$
Tavares-Silva et al., 2019 Homeopathic medicine of <i>Melissa officinalis</i> combined or not with <i>Phytolacca decandra</i> in the treatment of possible sleep bruxism in children: A crossover randomized triple-blinded controlled clinical trial [17]	(P) 3- to 12-year-old children with sleep bruxism (I) Homeopathy: <i>Melissa officinalis</i> (MO), <i>Phytolacca decandra</i> (PD), combination of MO and PD. (C) Comparison with control group (O) To evaluate the effectiveness of homeopathy in reducing sleep bruxism symptoms (S) Randomized clinical trial	<i>M. officinalis</i> showed a higher mean reduction compared to the placebo ( $p=0.05$ ) and to <i>P. decandra</i> ( $p=0.018$ ). Also, the association of <i>M. officinalis</i> with <i>P. decandra</i> produced a similar result to <i>M. officinalis</i> alone ( $p=0.724$ ) Proxy-reported results: reporting bias
Mostafavi et al., 2019, The efficacy of low and moderate dosage of diazepam on sleep bruxism in children: A randomized placebo-controlled clinical trial [18]	(P) 2- to 15-year-old children with sleep bruxism (I) Intake of diazepam at bedtime (C) Comparison with a control group (O) To evaluate the effectiveness of homeopathy in reducing sleep bruxism symptoms (S) Randomized clinical trial	No statistically significant difference between the groups after treatment $p=0.554$ Proxy-reported results: reporting bias

Table 3:  
Qualitative  
assessment  
of results  
of studies

PICOS:  
Population  
,  
Intervention,  
Comparison  
on,  
Outcome,  
Study type

### Figure legends

Figure 1: Sleep bruxism-related tooth wear in a 6-year-old child

Figure 2: Sleep bruxism diagnosed in a 5-year-old child with adenoid facies, in the context of obstructive sleep apnea (OSA). Note dark circles, mucosal dryness, half-open mouth.

Figure 2a: Face view

Figure 2b: Profile view

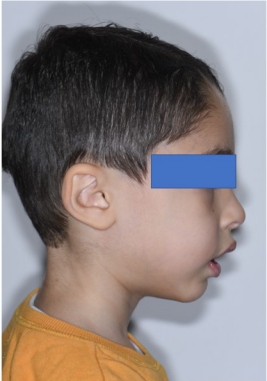
Figure 3: Flow chart of literature review strategy

Figure 4: Decision tree for management of patients with sleep bruxism









Keyword search: “bruxism” and “children”,  
for the period 2006-2020: 13,645 results  
Pubmed: 373  
ScienceDirect: 1334  
The Cochrane Library: 38  
Google Scholar: 11,900

13,425 articles excluded on the  
basis of their titles

220 potential articles selected by their  
title  
Pubmed: 80  
ScienceDirect: 9  
The Cochrane Library: 18  
Google Scholar: 113

160 articles excluded on the  
basis of their abstracts

60 potential articles selected after  
reading of the abstracts  
Pubmed: 22  
ScienceDirect: 5  
The Cochrane Library: 9  
Google Scholar: 24

21 articles excluded after reading  
of the complete texts

39 potential articles selected after  
reading of the complete texts  
Pubmed: 13  
ScienceDirect: 3  
The Cochrane Library: 8  
Google Scholar: 15

31 articles excluded after  
elimination of duplicates

8 articles selected

Sleep bruxism reported by parents

Is this frequent and is the tooth wear severe?

Need dentist evaluation

Is the patient anxious?

Need psychologist and psychiatric expertise

Does the patient show signs of ventilatory disorders (snoring, oral ventilation, dark circles, daytime sleepiness, etc)?

Need otolaryngologist and pulmonologist evaluation

Does the patient present other associated sleep disorders such as night terrors or agitation?

Need general practitioner and pediatrician expertise

No intervention

Sleep hygiene advice

Cognitive-behavioral approach

Proprioceptive treatment

Psychotherapy

Palatal expansion

Adenotonsillectomy

Need further research: occlusal splint, pharmacological treatment and homeopathy