

Review Article

Etiology, Diagnosis and Treatment of Bruxism in Children: A Review of the Literature

Anna Spanoudi¹, Nikoleta Maria Panagiotidou¹, Vasiliki Boka², Anastasia Dermata³, Aristidis Arhakis^{4*}

¹Dentist, Thessaloniki, Greece

²Department of Paediatric Dentistry, Faculty of Dentistry, Aristotle University of Thessaloniki, Thessaloniki, Greece

³Department of Paediatric Dentistry, Faculty of Dentistry, Aristotle University of Thessaloniki, Thessaloniki, Greece

⁴Assistant Professor, Department of Paediatric Dentistry, Faculty of Dentistry, Aristotle University of Thessaloniki, Thessaloniki, Greece

*Correspondence author: Aristidis Arhakis, DDS MDentSci PhD, Assistant Professor, Department of Paediatric Dentistry, Faculty of Dentistry, Aristotle University of Thessaloniki, Thessaloniki, Greece; E-mail: arhakis@dent.auth.gr

Citation: Spanoudi A, et al. Etiology, Diagnosis and Treatment of Bruxism in Children: A Review of the Literature. J Dental Health Oral Res. 2023;4(3):1-7.

<https://doi.org/10.46889/JDHOR.2023.4301>

Received Date: 19-08-2023

Accepted Date: 11-09-2023

Published Date: 18-09-2023



Copyright: © 2023 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CCBY) license (<https://creativecommons.org/licenses/by/4.0/>).

Abstract

Bruxism, a parafunctional habit often linked to stress, anxiety, or medical conditions, causes various symptoms such as jaw pain, headaches, tooth wear and potentially temporomandibular joint disorders. While bruxism is prevalent in children, the literature remains unclear on its characteristics in this age group, prompting further review and investigation.

The prevalence and onset of bruxism in children varies greatly between different studies and populations, with rates ranging from 6.5% to 88% and while most studies do not report a significant difference between boys and girls, some have found higher rates in one gender or the other. Bruxism has multiple causative factors including dental malocclusion, temporomandibular joint problems, emotional and psychological disorders, sleep disorders, nutritional deficiencies, medical problems, stress and heredity. However, the correlations between these factors and bruxism are multifactorial and sometimes contradictory. Bruxism diagnosis relies on patient history, clinical examination and diagnostic criteria, with polysomnography for nocturnal cases and BiteStrip® devices as alternatives, while diagnosing children presents challenges due to the lack of valid diagnostic means and the inadvisability of polysomnography.

The recognition of stressors and application of psychological stress reduction methods have also been found to have a significant effect in reducing or eliminating the signs of bruxism in children.

Treatment approaches for childhood bruxism vary and may include dental information, correction of malocclusion, occlusal splints, drugs and psychological methods. The use of hard occlusal splints has been found to prevent dental wear and reduce the frequency of bruxism in some studies, but further research is needed. The aim of this review is to summarize the

characteristics of bruxism in childhood.

Keywords: Bruxism, Children, Diagnosis, Etiology, Treatment

Introduction

Bruxism is a condition affecting many people by causing a variety of symptoms, such as jaw pain, headache and tooth wear. In some cases, bruxism can also lead to Temporomandibular Joint (TMJ) disorders. The exact cause of bruxism is not yet known, but it is believed to be related to stress, anxiety, or certain medical conditions [1]. Bruxism is considered a parafunctional habit as it is a repetitive, unconscious behavior that occurs outside of the normal functions of the jaw, such as chewing, speaking, or swallowing [1].

Bruxism can occur while the patient is awake mainly as clenching of the teeth and/or during sleep as clenching or grinding of the teeth. The majority of bruxists display this parafunctional activity during sleep. The mode, timing and duration of bruxism varies between individuals and has been associated with emotional, physical stress and overstimulation [1-3].

Bruxism is one of the causes of dental wear. The characteristic flat, worn areas on the chewing surfaces of teeth that result from bruxism range from mild to severe and may be localized or extend throughout the dental arch. Other symptoms that may appear in dental tissues as well as in the maxillofacial system are: sensitivity to thermal stimuli, mobility of the teeth, injury to the periodontal tissues, pulpal necrosis, displacement of the vertebral discs and tension-type headache [1-4]. Despite the fact that bruxism is a common phenomenon in childhood, its characteristic elements in children have not been yet. The literature on bruxism in children is confusing and there are no clear conclusions. The purpose of this review is to summarize the characteristics of bruxism in childhood.

Epidemiology

The prevalence of bruxism is the subject of research not only in dentistry but also in other health disciplines due to various etiological factors. The difficulty in diagnosis, the use of different recording methodology and the study of different population groups results in the prevalence of bruxism in children varying in the different epidemiological surveys from 6.5% to 88% [2]. Seraj, et al., examined 600 children with a mean age of 7.4 years, the prevalence of parent-reported bruxism was 26.2% [5]. Cheifetz, et al., examined 154 children under the age of 17, the prevalence of parent-reported bruxism was 38% [6]. Liu, et al., reported a lower prevalence rate of childhood bruxism in China, with a prevalence of 6.5% in children aged 2-12 years, while in younger children aged 3-6 years, bruxism was observed in 36.4% [7,8]. Reding, et al., reported a prevalence of bruxism of 15.1% in their survey of American children aged 3-17 years [9]. Farsi, et al., reported a prevalence of childhood bruxism of 8.4% in Saudi Arabia [10]. It is worth mentioning that some of these studies relied on parent-reported information, while others refer to bruxism that is also found clinically [5-10].

The age of onset of bruxism and its prevalence may vary depending on the study and population being studied. The age of onset of bruxism is defined as 3.6 years by Cheifetz, et al., while another study finds its onset at 4.9 ± 2 years [4]. In addition, other studies have reported a decrease in the prevalence of bruxism with increasing age, which may be related to changes in sleep patterns or other factors [10,11]. Regarding gender differences, most studies do not report a significant difference between boys and girls in the prevalence of bruxism [5,8,9,12]. However, some studies have reported higher rates of bruxism in boys, while others have found higher rates in girls [6,13-15]. When the two main features of bruxism were studied separately, adolescent girls reported significantly more frequent teeth grinding than boys of the same age [16]. Teeth clenching did not seem to have a difference between the two sexes [17].

Diagnosis

The diagnosis of bruxism is mainly achieved through the evaluation of patient's history and clinical examination. When taking the patient's dental history, information is requested regarding the existence and nature of the sounds produced during the clenching or grinding of the teeth, as these are reported by the patient's relatives [11,12,18]. Questions regarding the presence of maxillofacial pain, especially in the morning, or headaches are also enlightening. Dental abrasion, receding gums, hypertrophy of the masticatory muscles, the presence of sounds from the TMJ and sensitivity of the teeth when taking hot or cold can sometimes be observed to a different extent during the clinical examination in case of bruxism. Even though dental attrition is the result of many factors, it is considered the most differential diagnostic element for the existence of bruxism [1].

Kato, et al., suggest the following diagnostic criteria for the diagnosis of bruxism and its differential diagnosis from other conditions of the maxillofacial system:

- Report of teeth grinding or grinding noise during sleep, occurring at least 3 to 5 nights per week over a 6-month period
- Presence of dental attrition
- Discomfort or feeling of fatigue coming from the masticatory muscles in the morning
- Hypertrophy of the masticatory muscles [3]

In case of nocturnal bruxism, polysomnography examination could be added to the diagnosis. It is the most reliable method of

bruxism diagnose during sleep. Includes recordings from electroencephalogram, electroophthalmogram, electromyogram and electrocardiogram. The patient's symptoms, behavior and possible awakenings during sleep are analyzed and the possible presence of bruxism is documented. Even though the technique is considered reliable, it is a high-cost procedure and often causes discomfort to patient, due to monitoring within a hospital environment [17]. As an alternative to polysomnography, BiteStrip® devices are used in adults. These are diagnostic devices for recording the activity of maxillofacial system at home, mainly during night. They, also, detect the existence and record the frequency and duration of bruxism episodes [19].

There are no valid diagnostic means to detect bruxism in children [1]. Existing studies are based either on parent or caregiver reports or on a combination of questionnaires and clinical examination. The diagnosis of bruxism in children requires a complete patient's dental history, with child's parent or caregiver help, along with a thorough clinical examination [11,12,18]. Even though polysomnography test is particularly useful for confirming the presence of bruxism during sleep, it is not recommended for children due to its complexity and cost. The difficulties in bruxism diagnosis are barrier to its correct diagnosis in children. Worth to mention though, that systems similar to BiteStrip® device can also be used in children. Its sensitivity and predictive value make it an acceptable mean of diagnosing bruxism [19].

Etiology

The etiology of bruxism is multifactorial, while relevant studies results are conflicting [1]. Causative factors responsible for bruxism include local, psychological, systemic and genetic factors. According to Lobbezoo and Naeije, the appearance of bruxism is regulated by the central nervous system and influenced with physiological and psychological factors. Problems such as occlusal disharmony, parafunctional oral habits, illness and stress act as a trigger in the central nervous system which in turn causes a change in dopamine neurotransmission. Clenching and grinding of teeth is caused in response to this change [20]. A number of studies support the association of dental malocclusion and bruxism. Nilner studied the relationship between occlusion and bruxism in 440 children aged 7-14 years old. He showed a statistically significant correlation between Angle class II and III occlusion and bruxism [21]. Carlsson, et al., examined 402 children aged 7, 11 and 15 years, focusing on dental wear, occlusion and maxillofacial system function. 20 years later, the same subjects (94%) were clinically re-examined. It was found that the existence of Angle class II and dental wear in childhood is a predictive factor of dental wear in adulthood [22]. Ghafournia and Hajenourozali-Tehrani studied 400 children aged 3-6 years old. They showed that mesial step and flush terminal plane occlusion of primary molars have a statistically significant correlation with bruxism [23]. Lindqvist found more frequent presence of occlusal interference in children who grind their teeth [24]. Sari and Sonmez studied 182 children with a mixed dentition and 212 children with permanent dentition. A statistically significant correlation was found between bruxism and dental malocclusions such as 6mm horizontal overjet as well as overbite [25]. Occlusal changes during the mixed dentition period are also a causative factor that may be associated with bruxism in children [2]. On the contrary, other researchers did not find any statistically significant correlation between various occlusal abnormalities and bruxism [26-29].

Temporomandibular Joint (TMJ) problems have been claimed to be associated with bruxism in children in several studies [4,30,31,32,33]. Specifically, Seraj, et al., examined 600 children aged 4-12 years. 63.6% of the participants with TMJ problems were bruxists. The corresponding percentage of bruxism in children who did not have TMJ problems was 24.7% and that was a statistically significant result [5]. Winocur, et al., in their research on 323 girls aged 12-15 years found a statistically significant association of bruxism with TMJ problems such as sounds, pain and trismus [34]. On the contrary, Cheifetz, et al., found no such correlations in their study of children aged 8 years on average [6].

It is argued that caries, toothache and sharp teeth, are also related to bruxism [23]. Nutritional deficiencies, along with other medical problems including allergies, hyperthyroidism and asthma have also been linked to bruxism [35,36]. It has been reported that bruxism is more frequent in children with cerebral palsy, intellectual disability and Down syndrome [9,37]. Bruxism has been associated with emotional disorders such as anxiety, depression and anger. Serra-Negra, et al., used questionnaires in 652 children aged 7-10 years and they found a strong correlation of bruxism with high levels of anxiety [18]. Stress was also found to be a causative factor in the study of Monaco, et al., on bruxism in children [38]. A pilot study, conducted using polysomnography in 10 children with bruxism, supports that these children present higher levels of arousal during sleep, which may be associated with behavioral problems and ADHD [39]. Cheifetz, et al. and Agargun, et al., found a relationship between bruxism and psychological disorders as well as ADHD [6,39]. Themessl-Huber reports that bruxism is related to child's emotional

problems, however they did not find any relationship with depression [13]. Stressful situations in the child's life such as parents' divorce, environment change or even death in the family can be causal factors of bruxism [5].

In addition, the literature reports a correlation between bruxism and sleep disorders [6,13]. Weideman, et al., specifically argue that children who drooled or sleep talk were more likely to exhibit bruxism [40]. In another study, 25.8% of children who exhibit bruxism were drooling during sleep, while 3.2% had frequent episodes of sleepwalking [13]. Lam, et al., in their study of 6389 children with an average age of 9.2 ± 1.8 years, found a correlation between bruxism and parasomnia activities, with sleep talking being more frequent [11].

Various socio-demographic and socio-economic factors have been implicated as causative factors of bruxism. However, the correlations are multifactorial and sometimes contradictory. Themessl-Huber study 1674 children aged 7-11 years. Children from very low economic backgrounds as well as those from very high economic backgrounds exhibited bruxism more frequently than those whose families were less extreme financial profiles [13]. Finally, heredity contributes to the appearance of bruxism. In the study by Seraj, et al., bruxism was 2.6 times more common in children whose parents were bruxists than in children with no family history of bruxism [5]. Similarly, Cheifetz, et al., argue that if one parent had a history of bruxism, their children were 1.8 more likely to bruxism [6].

Treatment

Clenching or grinding of teeth is a common activity in both adults and childhood and occasionally is considered an almost normal activity. The therapeutic approach is often symptomatic, inhibiting to some extent the effects of bruxism on the maxillofacial system [41]. Bruxism in childhood is argued to be self-limiting activity [42]. Kieser and Groeneveld in their study showed that out of 126 children aged 6-9 years of age, only 17 were still bruxists 5 years later [42]. With the early diagnosis and treatment of bruxism, oral and maxillofacial problems as well as subsequent problems in the general health of children are prevented [15].

There are conflicting views on the need and effectiveness of therapeutic intervention in childhood bruxism. Most research on bruxism treatment concerns adults and there is not enough research documentation on bruxism treatment in childhood [43-45]. According to the literature, the possible approaches to the bruxism treatment, vary and may include dental information to patient and his/her parents, correction of malocclusion, use of occlusal splints, drugs and psychological methods [39-41]. The process of balancing the occlusion, does not have sufficient bibliographic documentation [45]. Its application to children should not be adopted as a routine therapy to treat bruxism, since it is a non-reversible approach except for few exceptions where dental interference is particularly intense [46].

Occlusal splints are often used in adult patients with bruxism. These devices are usually manufactured by hard acrylic and applied to the upper or lower dental arch. They prevent teeth contact as well as teeth wear and consequently, they prevent the decrease of vertical dimension. Additionally, it has been argued that the use of these devices acts therapeutically too by reducing the activity of bruxism [47-50]. Other studies mentioned that these devices reduce the bruxism frequency but not its duration or intensity [45,46]. Giannasi, et al., studied 17 children with bruxism in a pilot study. In the study group where hard occlusal splints were used a reduction of bruxism along with concomitant symptoms such as teeth grinding and headaches was observed within 90 days [47]. Cavalho, et al., studied 12 children aged 6-10 years with bruxism. They showed relaxation of mastication muscles after 1 month of hard occlusal splint use [51]. Macedo, et al., in their systematic review found advantages of the use of these devices in the prevention of dental wear [52]. Similarly, a decrease in dental wear in children aged 3-5 years who used hard occlusal splints was observed [53]. On the contrary, in a survey by Restrepo, et al., 36 children aged 3-6 years, use of hard occlusal splints for 2 years. This study group did not have any statistically significant effect on reducing dental wear and TMJ symptoms compared to the control group [54]. It is worth to mention that child's craniofacial development follows a complex development, with a peak at puberty. Thus, the use of occlusal splints at young ages requires frequent recalls to be subject to appropriate modifications to bone growth [41].

Bruxism treatment associated with other health problems often lies in controlling these problems [50]. The study by DiFrancesco, et al., included 69 children aged 2-12 years with respiratory problems who were to undergo adenoidectomy and tonsillectomy.

45.6% of these children presented Bruxism. The percentage of children presenting with Bruxism decreased to 11.8%, 3 months after the operation [55].

The recognition of the nature of the stressor - anger, confusion, high goals - must follow the application of specific techniques. The application of psychological stress reduction methods in children was found to have a statistically significant effect in reducing or eliminating the signs of bruxism [56].

Further research is needed regarding the treatment of bruxism in children as the existing literature does not provide the necessary documentation [40].

Conclusion

Bruxism is defined as the involuntary, non-functional clenching or grinding of teeth and occurs mainly at night. It causes dental attrition as well as other symptoms in dental and periodontal tissues. The diagnosis of bruxism in children is based on parental reports and clinical examination. The prevalence of bruxism in children varies in different epidemiological studies and ranges from 6.5% to 88%. The etiology of bruxism is multifactorial, while causative factors responsible for bruxism include local, psychological, systemic and genetic factors. Evidence regarding the need for bruxism treatment in children is considered insufficient. The therapeutic approach to bruxism in childhood includes informing the parents and monitoring the patients. In specific cases, psychological methods and occlusal splints can be used.

Conflict of Interest

The authors have no conflict of interest to declare.

References

1. Machado E, Dal-Fabbro C, Cunali PA, Kaizer OB. Prevalence of sleep bruxism in children: a systematic review. *Dental Press J Orthod*. 2014;19(6):54-61.
2. Barbosa TS, Miyakoda LS, Pocztaruk Rde L, Rocha CP, Gavi o MB. Temporomandibular disorders and bruxism in childhood and adolescence: review of the literature. *Int J Pediatr Otorhinolaryngol*. 2008;72(3):299-314.
3. Kato T, Blanchet PJ, Montplaisir JY, Lavigne GJ. Sleep bruxism and other disorders with orofacial activity during sleep. *Sleep and movement disorders*. Philadelphia: Palo Alto: Butterworth Heinemann; 2003;24:273-85.
4. Lavigne GJ, Khoury S, Abe S, Yamaguchi T, Raphael K. Bruxism physiology and pathology: an overview for clinicians. *J Oral Rehabil*. 2008;35:476-94.
5. Seraj B, Shahrabi M, Ghadimi S, Ahmadi R, Nikfarjam J, Zayeri F, et al. The Prevalence of Brux- ism and Correlated Factors in Children Referred to Dental Schools of Tehran, Based on Parent's Report. *Iran J Pediatr*. 2010;20(2):174-80.
6. Cheifetz AT, Osganian SK, Allred EN, Needleman HL. Prevalence of bruxism and associated correlates in children as reported by parents. *J Dent Child (Chic)*. 2005;72(2):67-73.
7. Liu X, Ma Y, Wang Y, Jiang Q, Rao X, Lu X, Teng H. Brief report: An epidemiologic survey of the prevalence of sleep disorders among children 2 to 12 years old in Beijing, China. *Pediatrics*. 2005;115(1 Suppl):266-8.
8. Chen YQ, Cheng HJ, Yu CH. Epidemic investigation on 3 to 6 years children's bruxism in Shanghai. *Shanghai Kou Qiang Yi Xue*. 2004;13(5):382-4.
9. Reding GR, Rubright WC, Zimmerman SO. Incidence of bruxism. *J Dent Res*. 1966;45(4):1198-204.
10. Farsi NM. Symptoms and signs of temporomandibular disorders and oral parafunctions among Saudi children. *J Oral Rehabil*. 2003;30(12):1200-8.
11. Lam MH, Zhang J, Li AM, Wing YK. A community study of sleep bruxism in Hong Kong children: association with comorbid sleep disorders and neurobehavioral consequences. *Sleep Med*. 2011;12(7):641-5.
12. Insana SP, Gozal D, McNeil DW, Montgomery-Downs HE. Community based study of sleep bruxism during early childhood. *Sleep Med*. 2013;14(2):183-8.
13. Themessl-Huber M. Bruxism in children appears to be as- sociated with emotional problems but not depression. *J Evid Based Dent Pract*. 2012;12(4):231-3.
14. Bayardo RE, Mejia JJ, Orozco S, Montoya K. Etiology of oral habits. *ASDC J Dent Child*. 1996;63(5):350-3.

15. Gorayeb MA, Gorayeb R. Association between headache and anxiety disorders indicators in a school sample from Ribeirao Preto, Brazil. *Arq Neuropsiquiatr*. 2002;60(3-B):764-8.
16. Wanman A, Agerberg G. Mandibular dysfunction in adolescents. Prevalence of symptoms. *Acta Odontologica Scandinavica*. 1986;44:47-54.
17. Glaros AG. Incidence of diurnal and nocturnal bruxism. *J Prosthetic Dentistry*. 1981;45:545-9.
18. Serra-Negra JM, Ramos-Jorge ML, Flores-Mendoza CE, Paiva SM, Pordeus IA. Influence of psychosocial factors on the development of sleep bruxism among children. *Int J Paediatr Dent*. 2009;19(5):309-17.
19. Shochat T, Gavish A, Arons E, Hadas N, Molotsky A, Lavie P, et al. Validation of the BiteStrip screener for sleep bruxism. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2007;104(3):32-9.
20. Lobbezoo F, Naeije M. Bruxism is mainly regulated centrally, not peripherally. *J Oral Rehabil*. 2001;28:1085-91.
21. Nilner M. Relationship between oral parafunctions and functional disturbances in the stomatognathic system in 7 to 14 year olds. *Acta Odontol Scand*. 1983;41:167-72.
22. Carlsson GE, Egermark I, Magnusson T. Predictors of bruxism, other oral parafunctions and tooth wear over a 20 year follow-up period. *J Orofac Pain* 2003;17:50-7.
23. Ghafournia M, Hajenourozali Tehrani M. Relationship between bruxism and malocclusion among preschool children in Isfahan. *J Dent Res Dent Clin Dent*. 2012;6(4):138-42.
24. Lindqvist, B. Occlusal interferences in children with bruxism. *Odontologisk Revy*. 1973;24:141-8.
25. Sari S, Sonmez H. The relationship between occlusal factors and bruxism in permanent and mixed dentition in Turkish children. *J Clin Pediatr Dent*. 2001;25:191-4.
26. Demir A, Uysal T, Guray E, Basciftci FA. The relationship between bruxism and occlusal factors among seven- to 19-year-old Turkish children. *Angle Orthod*. 2004;74:672-6.
27. Cheng HJ, Chen YQ, Yu CH, Shen YQ. The influence of occlusion on the incidence of bruxism in 779 children in Shanghai. *Shanghai Kou Qiang Yi Xue*. 2004;13:98-9.
28. Clarke NG. Occlusion and myofascial pain dysfunction: is there a relationship? *J Am Dent Assoc*. 1982;104(4):443-6.
29. Gunn SM, Woolfolk MW, Faja BW. Malocclusion and TMJ symptoms in migrant children. *J Craniomandib Disord*. 1988;2:196-2000.
30. Egermark-Eriksson I, Carlsson GE, Magnusson T. A long-term epidemiologic study of the relationship between occlusal factors and mandibular dysfunction in children and adolescents. *J Dental Res*. 1987;66:67-71.
31. Egermark-Eriksson I, Ingervall B, Carlsson GE. The dependence of mandibular dysfunction in children on functional and morphologic malocclusion. *Am J Orthod*. 1983;83(3):187-94.
32. Widmalm SE, Gunn SM, Christiansen RL. Association between CMD signs and symptoms, oral parafunctions, race and sex, in 46 year old African American and Caucasian children. *J Oral Rehabil*. 1995;22(2):95-100.
33. Restrepo CC, V squez LM, Alvarez M. Personality traits and temporo mandibular disorders in a group of children with bruxing behaviour. *J Oral Rehabil*. 2008;35(8):585-93.
34. Winocur E, Gavish A, Finkelshtein T. Oral habits among adolescent girls and their association with symptoms of temporo mandibular disorders. *J Oral Rehabil*. 2001;28(7):624-9.
35. Ahmad R. Bruxism in children. *J Pedod*. 1986;10(2):105-26.
36. Cash RC. Bruxism in children: review of the literature. *J Pedod*. 1988;12(2):107-27.
37. Brown RH. Traumatic bruxism in a mentally retarded child. *NZ Dent J*. 1970;66:67-70.
38. Monaco A, Ciammella NM, Marci MC, Pirro R, Giannoni M. The anxiety in bruxer child: A case-control study. *Minerva Stomatol*. 2002;51(6):247-50.
39. Agargun MY, Cilli AS, Sener S. The prevalence of parasomnias in preadolescent school aged children: a Turkish sample. *Sleep*. 2004;27(4):701-5.
40. Weideman CL, Bush DL, Yan Go FL. The incidence of parasomnias in child bruxers versus nonbruxers. *Pediatr Dent*. 1996;18(7):456-60.
41. Huynh N, Manzini C, Rompré PH, Lavigne GJ. Weighing the potential effectiveness of various treatments for sleep bruxism. *J Can Dent Assoc*. 2007;73(8):727-30.
42. Kieser JA, Groeneveld HT. Relationship between juvenile bruxing and craniomandibular dysfunction. *J Oral Rehabil*. 1998;25(9):662-5.

43. Restrepo CC, Gomez S, Manrique R. Treatment of bruxism in children: a systematic review. *Quintessence Int.* 2009;40(10):849-55.
44. Antonio AG, Pierro VS, Maia LC. Bruxism in children: a warning sign for psychological problems. *J Can Dent Assoc.* 2006;72(2):155-60.
45. Uraguchi R. The relationship among nocturnal teeth grinding, occlusal interference and psychological personality. *Nippon Shishubyo Gakkai Kaish.* 1981;23:126-46.
46. Clarke NG, Townsend GC, Carey SE. Bruxing patterns in man during sleep. *J Oral Rehabilitation* 1984;11:123-7.
47. Giannasi LC, Santos IR, Alfaya TA, Bussadori SK, Franco de Oliveira LV. Effect of an occlusal splint on sleep bruxism in children in a pilot study with a short-term follow up. *J Bodyw Mov Ther.* 2013;17(4):418-22.
48. Hamada T, Kotani, H, Yamada S. Effect of occlusal splints on the EMG activity of the masseter and temporal muscles in bruxism with clinical symptoms. *J Oral Rehabilitation.* 1982;9:119-23.
49. Cassisi JE, McGlynn FD, Mahan PE. Occlusal splints effects on nocturnal bruxing: An emerging paradigm and some early results. *J Craniomandibular Practice* 1987;5:64-68.
50. Kydd WL, Daly C. Duration of nocturnal tooth contacts during bruxing. *J Prosthetic Dentistry.* 1985;53:717-21.
51. Carvalho AL, Cury AA, Garcia RC. Prevalence of bruxism and emotional stress and the association between them in Brazilian police officers. *Braz Oral Res.* 2008;22(1):31-5.
52. Macedo CR, Silva AB, Machado MA, Saconato H, Prado GF. Occlusal splints for treating sleep bruxism (tooth grinding). *Cochrane Database Syst Rev.* 2007;7:CD00551.
53. Hachmann A, Martins EA, Araujo FB, Nunes R. Efficacy of the nocturnal bite plate in the control of bruxism for 3 to 5 year old children. *J Clin Pediatr Dent.* 1999;24(1):9-15.
54. Restrepo CC, Medina I, Patio I. Effect of occlusal splints on the temporomandibular disorders, dental wear and anxiety of bruxist children. *Eur J Dent.* 2011;5(4):441-50.
55. DiFrancesco RC, Junqueira PA, Trezza PM, de Faria ME, Frizzarini R, Zerati FE. Improvement of bruxism after T and A surgery. *Int J Pediatr Otorhinolaryngol.* 2004;68(4):441-5.
56. Restrepo CC, Alvarez E, Jaramillo C, Vélez C, Valencia I. Effects of psychological techniques on bruxism in children with primary teeth. *J Oral Rehabil.* 2001;28(4):354-60.

Journal of Dental Health and Oral Research



Publish your work in this journal

Journal of Dental Health and Oral Research is an international, peer-reviewed, open access journal publishing original research, reports, editorials, reviews and commentaries. All aspects of dental health maintenance, preventative measures and disease treatment interventions are addressed within the journal. Dental experts and other related researchers are invited to submit their work in the journal. The manuscript submission system is online and journal follows a fair peer-review practices.

Submit your manuscript here: <https://athenaeumpub.com/submit-manuscript/>