

BRUXISM IN CHILDREN: EFFECTIVENESS OF BITE SPLINTS

ABSTRACT

AIM: The aim 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 by patients. **METHODS:** The sample consisted of 30 children with bruxism, aged 7 to 10 years, attending the Pediatric Dentistry Clinic of the University of Southern Santa Catarina. After approval by the ethics committee and parental informed consent agreement, children underwent anamnesis, physical examination, and alginate molding for fabrication of acrylic bite splints. The children were reassessed after 15 days and after 4, 8 and 12 months of splinting use through new clinical examination and questionnaires. **RESULTS:** The use rate of bite splints shows that there was a positive correlation ($rP=0.9961$) between the decrease in use and time elapsed. The parafunctional habit of bruxism was no longer observed in 76.7% of the sample. It was observed that both symptoms evaluated, headache and muscular discomfort, showed a behavior that, if present at the beginning of treatment, declined during follow-up. No splint wear and tear was observed. **CONCLUSION:** 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.

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INTRODUCTION

Bruxism is known as a parafunctional activity of teeth grinding or clenching, characterized by nonfunctional mandibular movements, voluntary or involuntary, daytime or nighttime.¹

Bruxism is a hot topic in the field of dentistry because there is no real treatment for it. Bruxism has a very complex etiology, such as occlusal and systemic factors, among which the most significant include allergic (rhinitis, asthma) and psychological disorders (anxiety, depression, emotional stress, and fear). Although the patient's life is not at risk, it can influence quality of life, especially through problems such as tooth wear, fractures, headaches, and masticatory muscle and TMJ disorder.²

Bruxism is very common among children, both in the primary dentition and in the mixed dentition.² According to the literature, the prevalence of bruxism in children ranges from 7% to 88% and the author believes that this occurs due to lack of standardization of criteria for bruxism assessment.³

Frequent signs and symptoms of nocturnal bruxism include headache, temporomandibular joint dysfunction, masticatory muscle discomfort and atypical faces.⁴

Occlusal adjustment, orthodontic treatment, restorative treatment, occlusal splints, pharmacological therapies such as muscle relaxants, antidepressants and dopaminergic agents, and psychological therapies can be mentioned as alternative treatments to combat bruxism. The treatment can have general goals such as reducing the physical strain, treating the signs and symptoms, minimizing occlusal irritation, and breaking up habitual neuromuscular patterns.⁵⁻¹⁰

Acrylic resin bite splints are widely used for bruxism treatment among children and adults, although there are claims in the literature that bite splints are only used to control or lessen symptoms, not to cure bruxism. The occlusal splint avoids teeth wear, protects ATM, better distributes the loads and decreases parafunctional activity, which justifies the scope of this research on children during mixed dentition.¹¹

Based on some studies that have suggested the use of bite splints in children who have bruxism signs and symptoms, the objective of this study is to evaluate the effectiveness of acrylic bite splints to reduce the habit or to eliminate or reduce the symptoms caused by bruxism in children during mixed dentition and make them accept this treatment method. The hypothesis of this study was that there is an effective reducing of symptoms of headache, muscle discomfort and

parafunctional habit of bruxism using occlusal splints.

MATERIAL AND METHODS

The study subjects were 30 children of both genders, aged 7 to 10 years, attending the Pediatric Dentistry Clinic of the University of Southern Santa Catarina. After approval by the ethics committee and parental informed consent agreement, children in mixed dentition presenting parafunctional symptoms or diagnosed as suffering from nocturnal bruxism were selected for the study. A careful anamnesis and clinical examination was performed to rule out other pathologies.

The splints were made as proposed by Gray and Davies (2001)¹¹ in semi-adjustable articulator mounted in centric relation obtained by frontal manipulation of the patient and recorded on wax-bite registration (Polidental, Cotia, São Paulo, Brazil). A screw expander was placed in the central portion of the splint, so that the board would prevent the growth of the upper jaw, which was subsequently properly activated, according to the needs of each patient.

Rebasing of the board was made, when necessary, at the initial installation to improve its retention. All patients underwent occlusal adjustment for distribution and balance of dental contacts.

The children were evaluated after 15 days and after 4, 8 and 12 months of the installation of bite splints, and adjustment of interocclusal splints was made when necessary.

Evaluation of the effectiveness of bite splints was made based on the monitoring of

children through: a. clinical examination; b. information reported by children and parents together (Table 2); c. visual assessment of splint wear and tear.

Statistical analysis were performed using Chi-square tests, Fischer's exact test and Pearson correlation.

RESULTS

Table 2 shows the adherence rate to the use of bite splints over time. Data analysis shows that there was a positive correlation ($rP=0.9961$) between the decrease in use and time elapsed. The impact of this can be seen in the percentage of children who started grinding teeth again one year after treatment. This condition was observed in 16.7% of those who stopped using bite splints, compared with 6.6% of those who kept using them. Moreover, the parafunctional habit of bruxism was no longer observed in 76.7% of the patients.

Tables 1 and 3 show the participants' behavior according to the symptoms of headache and muscle discomfort associated with the parafunctional habit. It was observed that both symptoms showed a behavior that, when present at the beginning of treatment, tended to decrease during follow-up. There was a statistically significant difference in the Chi-square test ($p=0.00012$) for the "headache" data criterion.

Despite this, the criterion for "muscular discomfort", the Chi-square analysis showed no statistically significant difference ($p=0.6599$) between scores "sometimes" and "never." This was probably due to the lower reporting rate of this symptom at the beginning of treatment.

With regard to the bite splint wear and tear observation, the professionals involved in this

research did not observe it in any patient throughout the study.

Table 1. Reports of muscle discomfort over time.

Time (days)	Often	Sometimes	Never
0	1 (3.3%)	5 (16.7%)	24 (80%)
15 days	0	3 (10%)	27 (90%)
4	0	3 (10%)	27 (90%)
8	0	2 (6.7%)	28 (93.3%)
12	0	2 (6.7%)	28 (93.3%)

Table 2. Adherence rate to the use of bite splints for bruxism treatment.

Period (days)	Status	Adherence rate (n)
15	Yes	100% (30)
	No	0% (Zero)
120	Yes	83.33% (25)
	No	16.66% (05)
240	Yes	70% (21)
	No	30% (9)
360	Yes	56.66% (17)
	No	43.33% (13)

Table 3. Reports of headaches over time.

Time (months)	Often	Sometimes	Never
0	16 (53.3%)	5 (16.7%)	9 (30%)
0.5	9 (30%)	4 (13.3%)	17 (56.7%)
4	1 (3.3%)	5 (16.7%)	24 (80%)
8	1 (3.3%)	4 (13.3%)	25 (83.3%)
12	1 (3.3%)	5 (16.7%)	24 (80%)

DISCUSSION

To date, there is no consensus on the most effective treatment method for bruxism due to its multifactorial etiology. According to the authors⁵⁻⁷ alternative treatments to control bruxism can be mentioned such as occlusal adjustment, orthodontic treatment, restorative

treatment, and occlusal splints. Occlusal splint use is a reversible treatment that should be indicated and used with caution in children, so as not to interfere with the growth process of the dental arches.¹² In order not to hinder the development of children's dental arches, the bite plates in the present study had a palatal expander.

An important factor in the treatment of bruxism in children is their acceptance of proposed therapeutic. After 15 days of installing the bite splint, all patients were using it regularly. In the second evaluation after 4 months, 83.33% of patients were using it and 16.66% had discontinued use. In the third evaluation, after 8 months, 70% of patients were using it. In the last evaluation after 1 year, 56.66% of patients were still using the dental appliance, while 43.33% no longer used it. According to parent's reports, forgetfulness was one of the causes for not using splints; others because children complained that splints cause discomfort and still others because they saw that children had stopped tooth grinding and thus concluded that the use was no longer required. Some authors¹³ state that the bite splints have a good acceptance by children and believe that the easy adaptation facilitates treatment success. However, Nissan (2001)¹⁴ says that splints are uncomfortable, and that some patients remove them during sleep, which could hamper mastication and cause temporomandibular joint disorder and gingivitis.

Although bite splints can be beneficial to protect teeth, the true treatment efficacy is still unclear according to some authors.¹⁰ The authors^{15,16} reported that occlusal splints reduce muscle activity related to bruxism, although the effect is only temporary, i.e., only for control. It would not be possible to obtain

an anticipated improvement in symptoms with this treatment. They concluded that occlusal splints are useful for controlling nocturnal bruxism; however, definitive treatment has not occurred yet.

Factors associated with bruxism act as stimuli in the CNS, which reacts with alteration in dopamine neurotransmission and the result is tooth grinding. Other factors also contribute to the parafunctional habit, such as body posture. Vélez et al. (2007)¹⁷ conducted a study comparing the posture and dental wear in children with and without bruxism during deciduous dentition and concluded that bruxism affects not only the muscles of mastication, but also all the muscles of the craniofacial complex, shoulders and neck, often presenting headaches.

Bruxism is usually related to musculoskeletal pain and TMD and, as seen earlier, headache also appears among its symptoms, as well as pain caused by overload on the dental pulp and periodontium.¹⁸ Di Francesco et al. (2004)¹⁸ confirms the symptoms of bruxism and also relates them to craniomandibular disorders, including recurrent headaches. Patients participating in this study reported the presence of headache before the use of bite splints (shown in table 3), and the clinical data show that there was a significant improvement over time. Sheikholeslam, Holmgren and Rüse (also

reported a reduction of symptoms in the long term in patients with bruxism who used bite splints for six months).¹⁹ This study also observed a reduction in complaints of discomfort in the muscles of mastication after one year (only 6.7% complained of this symptom), although the discomfort index was also low (20%) before the use of bite splints and, therefore, the difference was not statistically significant.

Most patients participating in this study did not grind teeth during treatment, and many did not return to grind teeth after one year (76.7%). This result is consistent with studies by Dube et al. (2004)²⁰ that showed that after two weeks of installing bite splints, there was a decrease in the parafunctional muscle activity. Clark et al. (2007)²¹ also observed that treatment with bite splints resulted in a nocturnal bruxism decrease in about half of patients, while one quarter of them showed an increase of parafunctional habit. Among children who returned to grind their teeth, most were composed of children who stopped using splints.

According to Svensson et al. (2008)²², further studies are still needed to determine the long-term effects and the best treatment options. In their clinical research, Jadidi et al. (2008)⁷ reported that there is a lack of statistical power due to a relatively low number of patients studied, as in the proposed

research, where out of 30 children studied only 17 continue treatment after one year. More long-term studies involving children are needed to ensure that this treatment method could effectively cure this parafunctional habit among children.

CONCLUSION

According to the methodology applied, it can be concluded that the proposed treatment was effective in reducing symptoms of headache, muscle discomfort and parafunctional habit of bruxism.

With regard to adherence to treatment, a decrease in splint use over time was observed as of 4 months. After one year, 56.66% of children were still using the dental appliance.

However, more long-term studies involving children are needed to indicate the most effective treatment method for bruxism in children.

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