

Relationship between Stress and Bruxism in Children Aged 9–11 Years

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Abstract

Bruxism, the habit of teeth-grinding, is a night-time parafunction activity of the mastication system. It has a multifactorial etiology, which includes morphological, pathophysiological, and psychosocial factors, and it has been considered that the psychosocial factors of stress, anxiety, and personality characteristics increase the risk of its occurrence. The present study aimed to analyze the relationship between stress and bruxism in children aged 9–11 years, and was conducted in 20 children with bruxism; 20 non-bruxism children of the same age range formed a control group. The diagnosis of bruxism was established on the basis of a bruxism questionnaire that was completed by parents, and via a clinical examinations to verify the presence of tooth wear. The Stress in Children questionnaire (SiC) was completed by the children to assess their stress level. The results showed that children with bruxism had a significantly higher SiC score than the non-bruxism children ($p < 0.05$). The correlation between stress and bruxism showed a statistically significant relationship ($p < 0.05$) with a strong correlation ($r = 0.66$).

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Introduction

The term “bruxism” is defined as a parafunctional occlusal parafunctional activity of the mastication system in the form of teeth grinding during sleep or when waking up, and can be experienced by adults and children.^{1,2} According to epidemiological research conducted in several countries, the prevalence of bruxism is high, ranging between 8.5 and 43%. In children, the prevalence ranges between 7 and 15.1%, with a higher frequency in girls.³ It is believed that bruxism can damage the stomatognathic system; it causes abnormal tooth wear and damage to periodontal tissue, and also results in the disruption of joints and/or the temporomandibular muscle.⁴ Bruxism has a complex, multifactorial etiology, involving morphological, pathophysiological and psychosocial factors, so it is difficult to identify. Psychosocial factors include the sense of anxiety, stress, and personality characteristics, and a feeling of frustration, anxiety, and fear can

stimulate the teeth grinding activity.⁵

Making a diagnosis of bruxism is a challenge for the dentist. A questionnaire is administered to investigate patient medical history, parafunctional habits, systemic and neurological disorders, lifestyle and quality of life, the relationship of the patient with their family, and social relationships. A combination of the questionnaire results and a finding of comprehensive clinical signs and symptoms in examinations, is the standard evaluation protocol used in diagnosis.⁴ Stress is a type of homeostasis mechanism that is activated as a result of an imbalance between the demands of the environment and the ability to adapt; if demands exceed an individual's ability to adapt, then stress may occur.^{6,7} Stress is always marked by symptoms that are predominantly manifested in adults, but some studies have shown that a large number of children also experience stress. Some investigations carried out in school children in Brazil showed that the prevalence of stress was high, ranging from 30–60%. Severe stress in children can result in a decreased ability to learn, as well as difficulties in interacting,⁸ and physiological reactions can occur in the form of diarrhea, stomach ache, nausea, nocturnal enuresis, loss of appetite,

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stammering, muscle pain, teeth-grinding, and hyperactive behavior.⁹

Some studies have examined the prevalence of bruxism and affecting factors, including psychosocial factors, in preschool children, and found that feelings of stress, frustration, anxiety, or fear can trigger teeth-grinding.⁵ The etiology of bruxism is multifactorial. Occlusion abnormalities, chronic stress, and mental disorders are responsible for this condition. It should be highlighted that there is a tendency of more frequent occurrence of oral parafunctions in highly developed societies.¹⁰ Children with bruxism are usually more anxious than children without the habit, and it has been reported that bruxism occurs in 40% of children with psychological problems.² The present study was conducted to assess whether there is a relationship between stress and bruxism in children aged 9–11 years, and used a questionnaire to diagnose stress.

Materials and methods

This was a descriptive, analytical study with a cross-sectional design, using a questionnaire and clinical examination. It was conducted in grades 3, 4, and 5 students at an elementary school in a suburban, Indonesia, and was approved by the school principal and by the Ethical Committee of the Faculty of Dentistry Universitas Indonesia, Jakarta, Indonesia. Inclusion criteria were as follows: an age of 9–11 years, a minimum bruxism history of once a week for 6 months, attrition of at least one tooth, and agreement of parents and children to participate. The exclusion criteria were tooth structure disorders, allergic rhinitis, obstructive sleep apnea, mental retardation, autism or cerebral palsy, receiving treatment with a medication that can affect muscular activity, such as an antihistamine, anxiolytic, or homoeopathic, or other medications with suppressive activity in the central nervous system, non-cooperative behavior, and ongoing orthodontic treatment. The control group was formed of non-bruxism children aged 9–11 years who agreed to participate and received the consent of their parents.

Of 280 bruxism questionnaires distributed by the researchers, 269 were returned and had been completed by the parents and children. The results of these questionnaires indicated that 29

children had bruxism. After conducting a teeth examination to assess teeth attrition as evidence of bruxism, 20 children had bruxism and 20 were non-bruxism children, according to the inclusion criteria. Attrition is teeth wear that has occurred because of the friction between the teeth. Teeth attrition can happen during the mastication process, but can become more severe when there is a habit of bruxism.¹¹ These 40 respondents then completed the Stress in Children (SiC) questionnaire while accompanied by a researcher. This questionnaire consists of 21 questions that were assessed on the basis of a four-point Likert scale. The overall score was obtained by summing the points obtained from the 21 questions; a higher number of points indicated a greater level of stress felt. The data were analyzed using Spearman's correlation coefficient with $p < 0.05$ to assess the relationship between stress and bruxism. Correlation tests were used to examine the relationship, direction, and strength.

Results

The SiC questionnaire was examined using validity and reliability tests. Its reliability was assessed using the Cronbach alpha test; a coefficient of more than 0.8 shows good internal consistency, 0.4–0.6 shows fair internal consistency, and less than 0.4 shows poor internal consistency. The value obtained was 0.987, which showed good internal consistency. The validity of the questionnaire was assessed using Pearson's correlation technique (two-tailed), and the result was ≥ 0.25 , which shows validity. The statistical analysis was carried out using the Shapiro-Wilk normality test, showing that the data were normally distributed. Spearman's correlation coefficient was used to identify the relationship between stress and bruxism, and values of $p < 0.05$ were considered statistically significant (Table 1). Table 1 show that the mean SiC score was statistically significantly higher in the bruxism group than in the non-bruxism group. Therefore, it can be stated that the children with bruxism had higher stress levels than the non-bruxism children. The correlation between SiC and bruxism scores was statistically significantly different ($p = 0.001$). The Spearman's correlation value of 0.66 shows that the correlation was strong and that the direction of the correlation was positive.

	N	Mean of SiC score ± SD	p-value
<i>Bruxism</i>	20	57.25±2.65	0.001
<i>Non-bruxism</i>	20	50.10±5.27	

Table 1. The difference in mean Stress in Children questionnaire scores between bruxism and non-bruxism children. SiC= Stress in Children questionnaire; The level of statistical significance was $p < 0.05$

Discussion

The present study was conducted to determine the relationship between stress and bruxism in children aged 9–11 years, via a questionnaire. The participants were grades 3, 4, and 5 students at the SDN Bantarjati 5, Bogor, Indonesia. The selection was based on the location of the study, as the school is near the clinic and other oral healthcare facilities, such as hospitals and other clinics. It was expected that parents and teachers would have sufficient information on oral healthcare, obtained from the nearest health counseling and oral healthcare facilities, which can be easily reached. In addition, state school children located in Bogor generally have a relatively similar socioeconomic status, and do not show a gap in this respect. The study participants consisted of 20 children with bruxism and 20 non-bruxism children aged 9–11 years. They were selected by using the data from the bruxism questionnaire completed by the parents and children, to identify the history of the bruxism, and by the clinical examination of the condition of the teeth to assess attrition resulting from bruxism.

The questionnaire completed by parents and children is intended to reveal the history of bruxism in children. It was based on the diagnostic criteria of the American Academy of Sleep Medicine (AASM) and consists of eight questions with yes or no answers. The questionnaire was modified such that the questions were intended to explore the history of bruxism in children, and some questions were removed as they are difficult to apply to children. These included, "Do you often strongly clench your upper and lower teeth or feel mouth pain when you wake up?", "Does the forehead feel tense when you wake up?" They were replaced with one question that is more simple to understand with regard to children: "Does your

child feel jaw discomfort/pain/rigidity/stiffness when waking up?". Moreover, this modification has been made in making a diagnosis of bruxism in children in previous studies.¹⁻⁴

Attrition of the teeth was clinically examined to support the questionnaire results regarding the history of bruxism. Attrition of only one tooth would be evidence of the existence of bruxism. If no teeth attrition was visible, then the bruxism inclusion criteria were not met, irrespective of a diagnosis of bruxism based on the results of the questionnaire completed by parents. Chronic teeth attrition is an objective parameter and therefore strengthens the subjective results obtained via the bruxism questionnaire. This study did not group children based on the severity of attrition, as the clinical examination of teeth attrition only reached the dentin, and did not show the severity of extreme attrition. Previously conducted research has shown that teeth attrition is an indicator of bruxism.¹¹

There is a high prevalence of tooth wear in children, possibly because the process of teeth erosion with abrasion and/or teeth attrition occurs at the same time. Attrition of the first teeth is also found, due to morphological factors, such as the enamel being different from that of permanent teeth.¹² Teeth attrition from functional and parafunctional activity is cumulative, and other factors, such as age, gender, diet, and bruxism, are also associated with attrition. Tooth attrition rarely occurs as a result of just one factor; usually, several factors interact to cause tooth wear. On the basis of this evaluation, tooth attrition as a predictor of bruxism remains controversial, and the extent to which bruxism causes tooth attrition is difficult to estimate.¹³

The level of stress in the children was calculated using the SiC questionnaire, which was designed for children aged 9–12 years. The questionnaire consists of 21 questions that are assessed using a four-point Likert scale. Previously conducted research using this questionnaire showed the existence of three factors: anxiety, lack of prosperity, and lack of social support.¹⁴ The present study was conducted in children aged 9–11 years, in accordance with the provisions of the SiC questionnaire. In addition, the existing psychology literature shows that it is a risk to allow children aged under 8 years to complete a questionnaire by themselves, and that it will

provide inconsistent results. In the present study, the questionnaire was examined using validity and reliability tests. The results showed good internal consistency (a Cronbach's alpha of 0.987) and the validity test showed that the results were valid. A researcher accompanied the children while they completed the SiC questionnaire, the children had been instructed to ask directly regarding any poorly understood questions, and the objectivity of the questionnaire was maintained. An unpaired t-test on the SiC score showed that the children with bruxism had significantly higher stress levels than non-bruxism children. This is in accordance with previous research which showed higher stress levels in groups of people with bruxism. Bruxism is associated with not just acute symptoms of anxiety and depression, but also with stable traits that measure susceptibility to negative emotions in a non-clinical community population.¹⁵

The Spearman correlation coefficient showed a strong correlation and positive direction between SiC score and bruxism ($r=0.66$). This is in accordance with previous research showing that stress and anxiety can be directly related to bruxism, and that increased stress has a strong correlation with bruxism.⁴ However, other research has stated that the relationship between stress and bruxism activity is very weak. Different findings may be due to age difference, bruxism diagnosing criteria, sample size and psychological questionnaire.¹⁶ School children nowadays have changed compared to those of 20 years ago. Many children feel depressed with their surroundings and show symptoms of stress and anxiety. Numerous factors contribute to this stress, both inside and outside school, including school problems (expectations, interactions with friends, bullying), family problems (financial, divorce of parents) and exposure to certain topics in the media (crime, war).⁴ In the present study, the stressor that triggered the bruxism could not be specifically identified because of the limitations of the questionnaire – it only allowed for a general description of stress.

Previous research that has shown a relationship between bruxism and psychological aspects, such as stress, anxiety, depression, and emotional disturbances, have primarily diagnosed bruxism on the basis of clinical evaluation and a report from the parents or guardians of the children. However, research

based on laboratory tests conducted during sleep only focus on bruxism as a movement disorder, and do not add information regarding the possibility of a relationship between bruxism and psychological parameters.⁴ Stress can be measured in a number of ways, such as the use of a questionnaire and a physiological examination. The present study used a questionnaire, but a limitation is that this questionnaire is subjective, so bruxism cannot be used as stress indicator. Indications of stress can be strengthened by conducting a physiological examination, such as measuring the amylase alpha and cortisol in the saliva.¹⁷ The present study shows the need for investigations that involve the dentist and the psychologist to improve the understanding of bruxism in children and to create a strategy for initiating interceptive treatment. This can prevent stomatognathic system disorders and other problems that can arise as a result of bruxism.

Conclusion

It can be concluded that there is a strong relationship between stress and bruxism in children aged 9–11 years. Further research regarding the relationship of stress and bruxism in children and to develop questionnaire that can more specifically identify the stressor that initially triggers the bruxism, is required. In addition, further studies regarding the relationship between stress and bruxism in children is necessary as a stress indicator, based on the level of amylase alpha and cortisol serum in the saliva.

Declaration of Interest

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