A Review of the Relationship of Bruxism with Temporomandibular Disorders in Children

Haran Achmad1*, Sri Wahyuni2, Yunita Feby Ramadhany3
1Department of Pedodontics, Faculty of Dentistry, Hasanuddin University, Makassar, Indonesia
2Clinical Dental Student, Faculty of Dentistry, Hasanuddin University, Makassar, Indonesia
3Dentist, Faculty of Dentistry, Hasanuddin University, Makassar, Indonesia

Correspondence Author: Harun Achmad
Pediatric Dentistry Department Faculty of Dentistry, Hasanuddin University, Perintis Kemerdekaan Street Km. 10 Makassar 90245, South Sulawesi - Indonesia
E-mail: harunachmader@gmail.com

ABSTRACT

Introduction: Bad habits often found in children such as bruxism may have a profound effect on the health of teeth, periodontium, masticatory muscles and TMJ temporomandibular joints. Excessive masticatory muscle activity can result in disruption of local blood flow and micro circulation, and the pain due to ischemia; bruxism increases excessive strength resulting in an abnormal burden on the mastication system causing changes in some elements of the stomatognathic system resulting in an imbalance that causes stomatognathic system dysfunction. Conclusion: Bruxism in children is usually influenced by psychological factors such as stress or excessive anxiety. Parafunctional habits such as bruxism will produce excessive strength so that abnormal loads in the mastication system cause changes in some elements of the stomatognathic system, causing an imbalance that causes stomatognathic system dysfunction such as TMJ pain, joints and myalgia.

Keywords: Sleep bruxism, awake bruxism, Temporomandibular Disorder (TMD)

Article History:
Submitted: 12.03.2020 Revised: 05.04.2020 Accepted: 27.05.2020

INTRODUCTION

Bad habits often found in children are very important to be detected early of their age because it can cause a very big influence on oral health. One of the bad habits in children is bruxism. Bruxism is an adaptation of the phrase "la bruxomania" which was first described in the medical literature by Marie Pietkiewicz in 1907. This word comes from the Greek “brychein”, which means clenching, grinding or grinding teeth, and the term “mania”, which is defined as coercion.1 Bruxism is a habit of parafunctional marked with gritting teeth during sleep or during the daytime.2 According to the American Academy of Sleep Medicine (AASM). In 2005, the International Classification of Sleep Disorders (ICSD) sleep bruxism is an activity

Oral parafunctionality is characterized by grinding teeth or clenching the jaws during sleep, usually characterized by rhythmic or non-rhythmic and awake bruxism occurring during wakefulness characterized by repeated or continuous tooth contact by strengthening or pushing the mandible.3,4 Bruxism is more common in children than adults and is less common in older people because it tends to decrease with age. The prevalence of bruxism in children ranges from 3.5% to 40.6%, and has no tendency towards sex.3,5,6 Parafunctional activity of bruxism has harmful effects on teeth, periodontium, masticatory muscles and TMJ temporomandibular joints which are often found in children and adolescents who also have psychological effects.10,13 Excessive masticatory muscle activity can result in disruption of local blood flow and micro circulation, and the presence of pain due to ischemia.1,14 Bruxism increases excessive strength thus it produces an abnormal burden on the mastication system causing changes in some elements of the stomatognathic system resulting in an imbalance that causes stomatognathic system dysfunction. Changes in the dimensions of the incisal or occlusal cervix, which can occur in both primary and permanent teeth, originate from the act of bluffing and tightening and locks most commonly known as bruxism.2 An increased higher activity increases the risk of oral health problems such as tooth wear, severe masticatory muscle pain, joint pain and temporomandibular disorders.1,3 The main cause of non-dental pain in the orofacial region in children and adolescents is temporomandibular disorders (TMD), which are disorders involving masticatory muscles, temporomandibular muscles, and related structures. The prevalence of TMJ disorders in children and adolescents ranges from 9.8% to 80%.1,3,5 In the literature, it suggests that the signs and symptoms of temporomandibular disorders (TMD) such as headaches, joint sounds, pain in the TMJ area, limited mouth opening, deviation-deflection, tenderness in TMJ, muscular pain.10,16 Temporomandibular disorders (TMD) can be identified by the presence of pain or sound in the TMJ area. Classification of sounds is based on the nature of sound ie single sound, explosion (click or pop) or continuous lattice (crepitus), its quality (hard or soft), the position is related to the movement of mandible (near, middle or wide) and whether sounds occur at the opening or closing of the jaw. There is a general consensus of clicks as a result of the impact between the mandibular condyle and the temporal component of the TMJ after rapid passage through the posterior band of the disc joint.10,17 Crepitus is found in an advanced stage of TMJ disorders and is associated with degenerative conditions. Several studies have explained that sounds in TMJ often occur in children with TMJ disorders.10,18,21 The purpose of this study is to identify through a systematic literature review,
whether bruxism in children has a relationship with temporomandibular disorders (TMD)

MATERIALS AND METHOD

Scientific evidence and cases are taken from the literature to support this review and information about the relationship of bruxism with temporomandibular joint disorders in children are collected.

LITERATURE SEARCH

A systematic review of the literature was carried out looking for all articles published about the relationship of bruxism with temporomandibular disorders (TMD) in children. On April 27th 2020, a literature search was carried out using the following keywords: “Bruxism and TMD in children, relationship bruxism and TMD, prevalence of bruxism and TMD in children”. The following databases were searched PubMed and Google Scholar.

LITERATURE REVIEW

1. Definition of Bruxism

Bruxism is a chronic habit of clenching jaws and sharpening teeth that occur in children, especially children under 5 years. Bruxism occurs most often during deep sleep at night, it may also occur during child experiencing stress or fear. Bruxism is a parafunctional activity caused by reflex chewing activities, but this is not the result of learning activities. Chewing is a complex neuromuscular activity that is controlled by the reflex supply pathway, where the highest controller is the brain. During sleep, this part is still active even though the central control is not active, it is at this phase that bruxism occurs. The compressive strength produced by bruxism is stronger than normal pressure, around 49-73.5 kg, while the bruxism pressure strength can reach 136 kg per 2.5 cm. The four main muscles that make up the masticatory system are the masseter muscle, temporalis muscle, medial pterygoid muscle, and lateral pterygoid muscle. Among the four masticatory muscles, the masseter has the most important role in bruxism.

2. Epidemiology of Bruxism

According to a systematic review, the prevalence of bruxism ranges from 5% to 40% in the world population. The difference in prevalence is due to different measurement instruments in determining the diagnosis of bruxism. In Brazil, the global prevalence of bruxism is 35.3% in the pediatric population. The prevalence of sleep bruxism varies in different age groups. In young adults aged between 18 and 29 years is 13%, reduced to 3% in individuals over 60 years old.

3. Factors Causing Bruxism

The etiology of bruxism is multifactorial. There are four factors that can trigger bruxism, namely psychological factors, local factors, systemic factors, and genetic factors. Psychological factors of stress are the biggest factors as the main causes of bruxism which include emotions, anger, fear or anxiety, tension, and frustration. Local factors that cause bruxism are occlusal discrepancies such as malocclusion, premature contact, dental growth errors in children, restoration errors and trauma to the teeth. If premature contact occurs in centric occlusion, the patient will unconsciously adjust to the habit of clenching but if premature contact occurs eccentrically, then the patient will unconsciously adjust to grinding. Systemic factors are one of the etiologies of bruxism, although this factor does not directly play a role in causing bruxism. These systemic factors include nutritional deficiencies and allergies. Genetic factors are thought to play a role as one of the etiologies of bruxism where bruxism is often seen by more than one person in family members, so genetic tendencies may exist for this bruxism condition.

4. Temporomandibular Joint Disorder

Temporomandibular (TMD) disorders, namely temporomandibular joint (TMJ) disorders, masticatory muscle disorders, headache disorders and abnormalities that affect the structure related. Clinical problems with TMD related to pain. Signs associated with TMD, such as TMJ sounds or distorted mandible movements. TMD associated with pain interferes with daily activities such as eating and talking. For some individuals, pain can be a chronic and persistent condition.

It is generally recognized that TMD is associated with the least pain. Prevalence in the adult population at the age of 18 and 45 years is 25%. Pain prevalence in TMJ disorders in children and adolescents ranges between 4% and 30%. This wide range is due to differences in methodology, diagnostic instruments and sample characteristics among various studies. The study was conducted on adolescents in Brazil and Iran, both developing countries, a higher prevalence rate for pain-related TMD was found than in northern European countries. The overall prevalence of pain-related TMD in the pediatric population in Indonesia was 23.4%, while 36.9% in the adolescent population.

About 37.5% of the adult population have some symptoms related to TMD. In addition to the clinical characteristics of TMD, some of the main symptoms associated with this disorder are TMJ pain, headache, TMJ clicking, pain in the ear, facial pain, mandibular restriction function, masticatory muscle fatigue, deviation from the mandibular passage, restriction of mouth opening, pain when chewing, tinnitus, neuralgia, lower jaw pain, and bruxism. However, in some cases, the presence of TMD has no symptoms.

Several factors can influence the development of TMD, the most relevant are direct trauma or macrotrauma, indirect or microtrauma; psychosocial factors, such as anxiety and depression; and pathophysiological factors, such as systemic (degenerative, neurological and rheumatological) and local diseases. Both sleep bruxism and awake bruxism are
masticatory muscle activities. Excessive muscle tone due to clenching teeth can be linked to local blood flow and microcirculation disorders, and pain originating from ischemia.\(^1\)

5. **Relationship of Bruxism with Temporomandibular Joint Disorders**

<table>
<thead>
<tr>
<th>No.</th>
<th>Authors and Titles</th>
<th>Year</th>
<th>Conclusion and Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ahmed Fathy Arafa, Nawras M. M. Mostafa and Shady Ahmed Moussa. Assessment Of Schoolchildren’s Temporomandibular Joint Sounds Associated With Bruxism. Journal: Journal of Dentistry Oral Disorder &amp; Therapy, January 2019, Vol 7(1):1-6</td>
<td>2019</td>
<td>Results: There was a statistically significant relationship between joint sounds and bruxism (p = 0.0184) ((p &lt;0.005)) of 56.67% ((n = 17)) including 88% ((\text{click} / \text{pop})) joint sounds ((n = 22)) and “crepitus” sounds 12% ((n = 3)) statistically showed that there was no significant relationship between the type of joint sounds and sex. There was no significant relationship between joint sounds and sex (p = 0.3326). However there was a relationship between age and joint sounds with a greater percentage in the 8-10 years age group and lower joint noise percentage at the age of 6-7 years. ((p&lt;0.05)). Conclusion: The prevalence of joint sounds is found to be higher in children aged eight to ten years compared to aged six and seven. And shows the relationship between bruxism and joint sounds in school children based on clinical findings shows a direct relationship between bruxism in children and the severity and development of joint sound symptoms.</td>
</tr>
<tr>
<td>2.</td>
<td>Larissa de Oliveira Reis, Rosangela Almeida Ribeiro, Carolina Castro Martins, Karina Lopes Devito Association between bruxism and temporomandibular disorders in children: A systematic review and meta-analysis Journal: International journal of Pediatric Dentistry. March 2019;29:585-595</td>
<td>2019</td>
<td>Results: Based on ten cross-sectional studies included in a systematic review 8 it showed a statistically significant relationship between bruxism and TMD but was at high risk of bias. The meta-analysis carried out formed 3 articles and obtained an OR 2.97 ((95% \text{CI} \text{ starting 1.72-5.15})) showing bruxism in children 2.97 times more likely to cause TMJ disorders with a very low degree of certainty. Conclusion: This study shows a high risk of bias, qualitative analysis of individual studies shows bruxism in children has a greater chance of developing TMD</td>
</tr>
<tr>
<td>3.</td>
<td>Mieszko Wieckiewicz, Joanna Smardz, Helena Martynowicz, Anna Wojakowska, Grzegorz M. Mazur, Efraim Winocur Distribution of temporomandibular disorders among sleep bruxers and non-bruxers- A polysomnographic study Journal: Journal Oral rehabilitation, 2020</td>
<td>2020</td>
<td>Results: TMD diagnosis: local myalgia, temporal tendinitis, myofacial pain, myofascial pain with referral, hypertrophy, osteoarthrosis, disk displacement with reduction, disk displacement without reduction with limited opening, subluxation, adhesion/compliance, arthralgia, headache associated with TMD and dystonia oromandibuar. From all the groups above, statistically none showed a significant difference between groups ((\text{bruxers}; \text{BEI} \geq 2)) and control groups ((\text{non-bruxers}; \text{BEI} &lt;2); \ (p&gt;0.05\text{ for all comparisons})) Conclusion: The distribution of TMD between sleep bruxism and non-bruxer looks the same. Therefore, the prevalence of sleep bruxism is not a risk factor for TMD. Based on the latest international consensus, sleep bruxism and awake bruxism are treated as two separate behaviors that are responsible for different clinical consequences.</td>
</tr>
<tr>
<td>4.</td>
<td>Emidgio Nogueira Coutinho MPH, et all Association between self-reported sleep bruxism and TMD development chances, students who reported sleep</td>
<td>2018</td>
<td>Results: From the data of 233 students who reported sleep bruxism 82% had TMD, statistically there was a significant relationship between sleep bruxism and TMD ((p &lt;0.001)). Comparing TMD development chances, students who reported sleep</td>
</tr>
<tr>
<td>Study</td>
<td>Authors</td>
<td>Year</td>
<td>Results</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Study of bruxism in undergraduate students from Brazil</td>
<td>Marpaung, C., van Selms, M. K. A., &amp; Lobbezoo, F.</td>
<td>2018</td>
<td>Prevalence of bruxism and temporomandibular disorders among Indonesian children and adolescents</td>
</tr>
<tr>
<td>Study of temporomandibular disorders in children</td>
<td>Pessia Friedman Rubin DMD, et al</td>
<td>2017</td>
<td>Results: Twenty-six participants (16.9%) were diagnosed as “sleep bruxism” and 57 participants (37%) were diagnosed as “awake bruxism”. Sex, age did not have a significant relationship to the prevalence of bruxism. In this study, it showed no significant (p = 0.095) relationship between SB and myalgia. Neither SB nor AB was associated with the history or clinical features of TMD. However, there was a significant relationship (p &lt;0.001) between sleep bruxism and awake clenching reports.</td>
</tr>
<tr>
<td>Systematic review of sleep bruxism in children and adolescents</td>
<td>Harun Achmad, et al</td>
<td>2018</td>
<td>The prevalence of sleep bruxism, awake bruxism, oral habits, and bruxism associated with pain among undergraduate students with a statistically significant relationship.</td>
</tr>
</tbody>
</table>
by the central nervous system, but they have different etiologies, clinical consequences, and therapeutic approaches, and therefore, their differences are very important. Several factors can influence the development of TMD, the most relevant are trauma, psychosocial factors, such as anxiety and depression; and pathophysiologic factors, such as systemic diseases and local factors. Both sleep bruxism and awake bruxism are the presence of masticatory muscle activity. Excessive muscle tone due to gritting teeth can be associated with local blood flow and microcirculation disorders, and pain originating from ischemia.16,18

In contrast to the results of a third study conducted by Jed Mieszko Wieckiewicz, et al in 2020, showed TMD symptoms such as local myalgia, temporal tendonitis, myofacial pain, myofascial pain with referral, hypertrophy, osteoarthrosis, disc shifts, limited mouth opening, subluxation, adhesions/adherence, arthralgia, headaches did not have relationship with the habits of both bruxism and non-bruxism in children. In line with the research method used by Raphael et al., conducting research on the importance of basing the diagnosis of sleep bruxism on the feelings of patient. Questionnaires were verified using polysomnography. Research showed that patients' feelings largely reflected reality only in the case of concurrent TMD, while they were not a reliable indicator of the actual incidence of sleep bruxism. This study showed the importance of polysomnographic examination in the diagnosis of sleep bruxism and the diagnostic superiority of the instrumental method compared to the non-instrumental method. Manfredini et al. reported that bruxism had a stronger relationship with muscular disorders compared with disc displacement and joint pathology.27,28

In the fourth study by Emidgio Nogueira Coutinho MPH, et al in 2018. This study shows a relationship between sleep bruxism and temporomandibular joint (TMJ) disorders in undergraduate students aged over 23 years, it is related to the effect of stress with increasing academic problems in this phase thus influences parafunctional habits and tends to influence developing TMD, bruxism and headaches. But according to research conducted by Mello et al. the severity of TMD varies according to age, related to the phase of tooth replacement for children, the development of puberty for adolescents and the reproduction period for adults. A study by Bortolameo revealed that individuals who had a parafunctional habit of awake-bruxism were 2.1 times higher for joint pain than those who did not have awake-bruxism. It was also observed by van Selms that bruxism sleep is associated with pain or jaw tension sensation when waking up in the morning and in a depressed mood. Characteristics of individuals who experienced TMD are due to damage caused by bruxism to the temporomandibular joint and the stomatognathic system of muscle contractions in the very long duration of time that occurs during parafunctional activity and the force produced on the occlusal surface becomes six times greater than the force produced on the movement of physiological.40,41,42

The fifth study by Pessia Friedman Rubin DM D, et al in 2017 suggested that there tends to be a relationship between sleep bruxism and TMD symptoms, namely myalgia but not on awake bruxism. Awakened bruxism does not have any relationship with the history or clinical appearance of TMD. This is related to research by Emodi et al. This finding is consistent with the theory that muscle pain as a result of mastication in wake and sleep conditions differs from the belief that AB is associated with psychological symptoms whereas AB is not related to psychological symptoms.38,40,43,44 And in a recent study by Marpaung, C, et al in 2018 suggested that the habit of bruxism in children has a relationship with disorders of the temporomandibular joint in the form of TMJ pain. This is in line with the research of several other studies conducted on children and adolescents. Mechanisms that are thought to be related to bruxism habits with TMJ pain will occur when delayed onset muscle pain is caused by excessive loading of the masticatory system from oral habits and bruxism activity.39,40,44,45

CONCLUSION

Bruxism in children is usually influenced by psychological factors such as stress or excessive anxiety. Parafunctional habits such as bruxism will produce excessive strength thus abnormal loads in the mastication system cause changes in some elements of the stomatognathic system, causing an imbalance that causes stomatognathic system dysfunction such as TMJ pain, joints and myalgia sounds.

REFERENCES

9. Carrara SV, Conti PCR, Barbosa JS. Statement of the 1st Consensus on Temporomandibular Disorders and...


