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A Review the Relationship of Bruxism with Temporomandibular Disorders in Children

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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.
Objective: To review the relationship between bruxism and temporomandibular disorders.
Method: Scientific evidence and clinical cases taken from the literature to support this review and information about the relationship of bruxism with temporomandibular disorders (TMD) in children is collected.
Results/Discussion: There were several relationships of bruxism with temporomandibular disorders such as joint sounds, myalgia and temporomandibular pain.
Conclusion: Brusixm in children is usually influenced by psychological factors such as stress or excessive anxiety. Parafunctional habits such as bruxismn 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)
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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.[3,5-9] 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,[3,14] 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 stomatognatic 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%.[3,15] 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 temporomadibur 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 maseter has the most important role in bruxism.[22]

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.[23] 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.[24]

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 bruxsm 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.[10-13, 25]

The mechanism of bruxism is initiated by the reaction of the masticatory muscles to stress where the stress experienced by the individual will be accepted by the limbic system as a stimulus that will cause nervous tension. This nerve tension will be distributed to the masticatory organs and cause the neuromuscular threshold value of the masticatory system to become hyperactive and an increase in muscle tone, therefore the patient unconsciously tries to look for occlusal hooks and grind teeth through excessive activity[10,16,25]

4. Temporomandibular Joint Disorder

Temporomandibular (TMD) disorders, namely temporomandibular joint (TMJ) disorders, masticatory muscle disorders, headache disorders and abnormalities that affect the structure related.[26,27,28] Clinical problems with TMD related to pain. Signs associated with TMD, such as TMJ sounds or distorted mandible movements.[29] TMD associated with pain interferes with daily activities such as eating and talking. For some individuals, pain can be a chronic and persistent condition..[26,30-32]

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.[26,33,34]

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, neural gias, lower jaw pain, and bruxism. However, in some cases, the presence of TMD has no symptoms.[35-37]

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.[3]

5. Relationship of Bruxism with Temporomandibular Joint Disorders

No.	Authors and Titles	Year	Conclusion and Results
1.	Ahmed Fathy Arafa, Nawras Maher Mostafaand Shady Ahmed Moussa. Assessment Of Schoolchildren's Temporomandibular Joint Sounds Associated With Bruxism. Journal: Journal of Dentistry Oral Disorder & Therapy, January 2019, Vol 7(1):1-6	2019	Results: There was a statistically significant relationship between joint sounds and bruxism p = 0.0184 (p <0.005) of 56.67% (n = 17) including 88% (click / 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<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.
2.	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	2019	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% CI 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
3.	Mieszko Wieckiewicz, Joanna Smardz, HelenaMartynowicz, Anna Wojakowska, Grzegorz Mazur , Efraim Winocur Distribution of temporomandibular disorders among sleep bruxers and non-bruxers- A polysomnographic study Journal: Journal Oral rehabibilitation, 2020	2020	Results: TMD diagnosis: local myalgia, temporal tendonitis, myofacial pain, myofascial pain with referral, hypertrophy, osteoarthrosis, disk displacement with reduction, disk displacement without reduction with limited opening, subluxation, adhesion/compliance, arthralgia, headaches associated with TMD and dystonia oromandibuar. From all the groups above, statistically none showed a significant difference between groups (bruxers; BEI ≥ 2) and control groups (non-bruxers; BEI <2); (p> 0.05 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.
4.	Emidgio Nogueira Coutinho MPH, et all Association between self-reported sleep bruxism and	2018	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 <0.0001). Comparing TMD development chances, students who reported sleep

	temporomandibulardisorder in undergraduate students from Brazil Journal: The Journal Of Craniomandibular & Sleep Practice, 2018		bruxism had 5.28 times (95% CI: 3.50-7.95; p <0.0001) greater chance of developing TMD than students who did not have sleep bruxism. In this study, female students (OR: 0.42, 95% CI 0.29-0.62, p <0.0001) and age group <23 years (OR 0.60, 95% CI: 0.42-0.86; p = 0.006) had a low chance of developing TMD Conclusion. Self-reported sleep bruxism and TMD have a high prevalence among undergraduate students with a statistically significant relationship.
5.	Pessia Friedman Rubin DMD, et al Prevalence of bruxism and temporomandibular disorders among orphans in southeast Uganda: A gender and age comparison Journal : The Journal of Craniomandibular & Sleep Practice, 2017	2017	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) 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 <0.001) between sleep bruxism and awake clenching reports. Conclusion: Only extensive oral chewing activity that is significantly associated with myalgia, sex and age has no impact on the prevalence of bruxism, oral habits, or TMD and Sleep bruxism and awake bruxism are not related to anamnestic symptoms or clinical findings on TMD
6.	Marpaung, C., van Selms, M. K. A., & Lobbezoo, F Prevalence and risk indicators of pain-related temporomandibular disorders among Indonesian children and adolescents Journal : Community Dentistry and Oral Epidemiology, 2018	2018	Results: The prevalence of TMD associated with pain in children in Indonesia self-reported among 812 adolescents aged 13-18 years (average 15.1 1.5) was 36.9% (95% CI = 33-41). Based on information from parental reports, single regression analysis showed that sleep bruxism, awake bruxism, oral habits, 3-4 psychological factors and body pain were related to TMD related pain among children. Conclusion: TMD associated with pain is common among Indonesia's young population. This finding corroborates them from previous studies in the young population, namely that bruxism and oral habits, complaints of body pain, and psychological factors are risk indicators for TMD related to pain.

Based on the results of the study included in this review, it seemed that there was a relationship between bruxism and temporomandibular joint (TMD) disorders such as pain around TMJ, limited mouth opening and joint sounds. In a study conducted by Ahmed Fathy Arafa, et.all in 2019 showed a relationship between bruxism and the presence of joint sounds in children. This is related to the parafunctional activity resulting in excessive force resulting in an imbalance of the masticatory muscles that can cause a shift in the articular disc from the normal position of the mandibular condyle to the glenoidal fossa thus a "click" occurs due to friction of the joint components when there is reduction to the superior condyles and when the disc returns to the anterior position of the mandibular condyles.[38-39] The findings of this study also revealed that joint sounds are associated with an increase in age especially at the age above eight years. The sound comes from the change in the shape of the TMJ which began to appear at the age of 6 years.[40]

The same thing also appears to be shown in the second study by Larissa de Oliveira Reis, et all in 2019. In this systematic review study, there is an association between bruxism and temporomandibular joint disorders (TMD). Bruxism has two different manifestations: Bruxism can occur during sleep (Sleep bruxism) or while awake (awake bruxism). Only four articles included in this systematic review distinguish sleepbruxism and awake bruxism, only one approaches the two classifications, while the other three report only sleep bruxism. The other (six articles) do not distinguish between two manifestations. According to Lavigne, et all argued that scientific knowledge about the characteristics and effects of bruxism is mainly based on the findings of studies on sleep bruxism. Sleep bruxism can be part of a sleep disorder, and it is more influenced by behavioral factors, such as caffeine use.[39,40]

Whereas maintained bruxism is more likely to be associated with psychosocial factors, such as stress. Both are mediated

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 pathophysiological 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.[36,38]

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, 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.[37,39]

In the fourth study by Emidgio Nogueira Coutinho MPH, et al in 2018. This study shows a relationship between sleep bruxism and temporomandibular join (TMD) 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 Bortolleto revealed that individuals who had a parfunctional 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 DMD, et al in 2017 suggested that there tended 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

Brusixm in children is usually influenced by psychological factors such as stress or excessive anxiety. Parafunctional habits such as bruxismn 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

1. Alves CL, Fagundes DM, Soares PBF, Ferreira MC. Knowledge of parents/caregivers about bruxism in children treated at the pediatric dentistry clinic.Sleep Sci. 2019;12(3):185-189.
2. Mayorquim MV, Filho IJZ, de Araujo TSB, Sciboni B, Tempest LM and Gomes MAR. Pediatric Bruxism: From Etiology to Treatment: A Review. Acta Scientific Dental Science 2018;2(3):17-20.
3. Reis LO, Ribeiro RA, Martins CC, Devito KL. Association between bruxism and temporomandibular disorders in children: A systematic review and meta-analysis. International journal of pediatric dentistry. 2019;29:585-595
4. Lobbezoo F, Ahlberg J, Raphael KG, Wetselaar P, Glaros AG, Kato T, et al. International consensus on the assessment of bruxism: Report of a working progress. J Oral Rehabil. 2018;45(11):837-44.
5. Bader G, Lavigne GJ. Sleep bruxism: an overview of an oromandibular sleep movement disorder. *Sleep Med Rev* 2000; 4(1): 27-43.
6. Manfredini D, Restrepo C, Diaz-Serrano K, Winocur E, Lobbezoo F. Prevalence of sleep bruxism in children: a systematic review of the literature. *J Oral Rehabil* 2013; 40(8): 631-642
7. Carra MC, Huynh N, Morton P, Rompré PH, Papadakis A, Remise C, et al. Prevalence and risk factors of sleep bruxism and wake-time tooth clenching in a 7- to 17-yr-old population. Eur J Oral Sci. 2011;119(5):386-94.
8. Murray GM, Peck CC. Orofacial pain and jaw muscle activity: a new model. J Orofac Pain. 2007;21(4):263-78.
9. Carrara SV, Conti PCR, Barbosa JS. Statement of the 1st Consensus on Temporomandibular Disorders and

Orofacial Pain. Dental Press J Orthod. 2010;15(3):114-20.
10. Arafa AF, Mostafa NM, Moussa SA, Assessment of Schoolchildren's Temporomandibular Joint Sounds Associated With Bruxism. J of Dentistry Oral Disorder & Therapy. 2019;7(1): 1-6.
11. 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.
12. Lobbezzo F, Naeije M. Bruxism is mainly regulated centrally, not peripherally. J Oral Rehabil. 2001;28(12):1085-91.
13. Ferreira-Bacci Ado V, Cardoso CL, Díaz-Serrano KV. Behavioral problems and emotional stress in children with bruxism. Braz Dent J. 2012. 23(3):246-51.
14. Raphael KG, Santiago V, Lobbezoo F. Is bruxism a disorder or a behavior? Rethinking the international consensus on defining and grading of bruxism. *J Oral Rehabil* 2016; 43(10): 791-798.
15. Feteih RM. Signs and symptoms of temporomandibular disorders and oral parafunctions in urban Saudi Arabian adolescents: a research report. *Head & Face Med* 2006; 2(25): 1-7.
16. Deepak Chauhan, Jairam Kaundal, Suneet Karol, Tripti Chauhan. Prevalence of signs and symptoms of temporomandibular disorders in urban and rural children of northern hilly state, Himachal Pradesh, India: A cross sectional survey. 2013;4(1):21-25.
17. Farsi NM. Symptoms and signs of temporomandibular disorders and oral parafunctions among Saudi children. J Oral Rehabil. 2003;30(12):1200-1208.
18. Vanderas AP, Papagiannoulis L. Multifactorial analysis of the aetiology of craniomandibular dysfunction in children. Int J Paediatr Dent. 2002;12(5):336-346.
19. Sari S, Sonmez H. Investigation of the relationship between oral parafunctions and temporomandibular joint dysfunction in Turkish children with mixed and permanent dentition. J Oral Rehabil. 2002;29(1):108-112.
20. Castelo PM, Gaviao MB, Pereira LJ, Bonjardim LR. Relationship between oral parafunctional/nutritive sucking habits and temporomandibular joint dysfunction in primary dentition. Int J Paediatr Dent. 2005;15(1):29-36.
21. Barbosa Tde S, Miyakoda LS, Pocztaruk Rde L, Rocha CP, Gaviao MB. Temporomandibular disorders and bruxism in childhood and adolescence: review of the literature. Int J Pediatr Otorhinolaryngol. 2008;72(3):299-314. doi: 0.1016/j.ijporl.2007.11.006.
22. Shita ADP. Bruxism in children and its handling. Stomatognatic (J.K.G. Unej) 2010 9; 7(1): 17-21.
23. Souza VA, Abreu MH, Resende VL, Castilho LS. Factors associated with bruxism in children with developmental disabilities. Braz Oral Res. 2015; 29(1):1-5.
24. Machado E, Dal-fabro C, Cunali PA, Kaizer OB. Prevalence of sleep bruxsm in children: a systematic review. Dental press J Orthodontics. 2014; 19(6)
25. Kurnikasari E. Various techniques for handling bruxism.Dentino Dentistry Journal. 2013;2(1): p.38.
26. Marpaung, C., van Selms, M. K. A., & Lobbezoo, F. (2018). Prevalence and risk indicators of pain-related temporomandibular disorders among Indonesian children and adolescents. Community Dentistry and Oral Epidemiolog. 2018; 46(4):400–406.
27. De Leeuw R, Klasser GD. Orofacial Pain: Guidelines for Assessment, Diagnosis, and Management. Chicago, IL: Quintessence Publishing Co,Inc; 2013.
28. Peck CC, Goulet JP, Lobbezoo F, et al. Expanding the taxonomy of the diagnostic criteria for temporomandibular disorders. J Oral Rehabil. 2014;41:2-23.
29. Karibe H, Shimazu K, Okamoto A, Kawakami T, Kato Y, Warita-Naoi S. Prevalence and association of self-reported anxiety, pain, and oral parafunctional habits with temporomandibular disorders in Japanese children and adolescents: a cross-sectional survey. BMC Oral Health.2015;15:8.
30. Michelotti A, Cioffi I, Festa P, Scala G, Farella M. Oral parafunctions as risk factors for diagnostic TMD subgroups. J Oral Rehabil. 2010;37:157-162.
31. Fillingim RB, Ohrbach R, Greenspan JD, et al. Potential psychosocial risk factors for chronic TMD: descriptive data and empirically identified domains from the OPPERA case-control study. J Pain. 2011;12: T46-T60.
32. Maixner W, Diatchenko L, Dubner R, et al. Orofacial pain prospective evaluation and risk assessment study–the OPPERA study. J Pain. 2011;12:T4-T11.
33. Sonmez H, Sari S, Oksak Oray G, Camdeviren H. Prevalence of temporomandibular dysfunction in Turkish children with mixed and permanent dentition. J Oral Rehabil. 2001;28:280-285.
34. Feteih RM. Signs and symptoms of temporomandibular disorders and oral parafunctions in urban Saudi Arabian adolescents: a research report. Head Face Med. 2006;2:25.
35. Achmad, H. Early Treatment of Malocclusion at the Age of Child Growth, Indonesian Institute of Health Studies (LSKI) Bandung. 2012. pp. 435-445. ISBN: 978-979-25-9916- 9.
36. Nogueira Coutinho, E., Pereira Rodrigues dos Santos, K., Henrique Barros Ferreira, E., Grailea Silva Pinto, R., & de Oliveira Sanchez, M. Association between self-reported sleep bruxism and temporomandibular disorder in undergraduate students from Brazil. CRANIO.2018:1–8.
37. Achmad, H. (2013). Interceptive Orthodontics; Rapid Palatal Expander in Anterior Tooth Crowding in Children: Journal of Dentistry, Journal of Dentistry (DENTOFASIAL), Vo.11 / No.2 /ISSN: 1412-8926.
38. Torres F, Campos LG, Fillipini HF, et al. Effects of treatments in dental physiotherapists and patients with temporomandibular disorders. Fisioter Mov. 2012;25(1):117– 125.
39. Cabral RP, Moiolli-Rodrigues ME, Motta FLK, et al. Temporomandibular disorder in university students of

the Parque das Rosas Campus, Universidade Estácio de Sá that practice sports. Health. 2016;8:18–23.

40. Lavigne GJ, Huynh N, Kato T, Okura K, Adachi K, Yao D, et al. Genesis of sleep bruxism: motor and autonomiccardiac interactions. Arch Oral Biol. 2007;52(4):381–384.
41. Achmad, H. (2017). Increased Overjet In Growing Child, Problem Solving in Pediatric Dentistry, Journal of International Dental and Medical Research pp. 374-379, Volume 10 Number 2. ISSN 1309-100X.
42. Smith RL, Carter DR, Schurman DJ. Pressure and shear differentially alter human articular chondrocyte metabolism: a review. Clin Orthop Relat Res. 2004;427(Suppl):S89–S95.
43. Susilowati M, Achmad H, Marhamah, Irene ER, Fuad H. (2019). Nickel and Chromium Ion Levels in Hair and Gingival Crevicular Fluid with the Corrosion of Brackets in Orthodontic Patients: A Longitudinal Study. Pesquisa Brasileira em Odontopediatria e Clínica Integrada ISSN 1519-0501, 2019, 19 (1): e4546.
44. Friedman Rubin, P., Erez, A., Peretz, B., Birenboim-Wilensky, R., & Winocur, E. Prevalence of bruxism and temporomandibular disorders among orphans in southeast Uganda: A gender and age comparison. CRANIO 2017; 36(4), 243–249.
45. Achmad, H. Adam M, Oktawati S, Ramadhany S, Thahir H, Pratiwi R, Wicita A. (2017). An Overjet Reduction of Class II, Division 1 Malocclusion in Twin Block Dentofacial Orthopedic and Fixed Orthodontic Treatment: Case Report, International Dental Research pp. 1110-1116, Volume 10 Number 3. ISSN 1309-100X.