ASSESSMENT OF TEMPOROMANDIBULAR JOINT SOUNDS IN CHILDREN WITH BRUXISM

Avaliação dos ruídos da articulação temporomandibular em crianças com bruxismo

Lara Jansiski Motta [(1)], Paula Fernanda da Costa Silva [(1)], Camila Haddad Leal de Godoy[(1)], Carolina Carvalho Bortoletto[(1)], Patrícia Rodrigues de Ázara Garcia[(2)], Fernanda Cordeiro da Silva[(1)], Sandra Kalil Bussadori[(3)]

ABSTRACT

Purpose: the aim of the present study was to determine whether between bruxism is associated with joint sounds in children. **Methods:** children aged six to nine years were recruited from the pediatric clinic of the School of Dentistry of Nove de Julho University (Brazil). Twenty-one children with bruxism and 27 children without this disorder (control group) were selected. The evaluation was performed by a previously trained examiner who was blinded to the allocation of the groups and involved manual palpation as well as lateral and dorsal extra-auricular auscultation of the temporomandibular joints with the aid of a stethoscope for the determination of joint sounds, differentiating a click/pop from crepitation. At least three readings were performed on each child. Descriptive statistics were conducted and the chi-square test was used to test the strength of associations between variables, with the level of significance set to 5% ($p < 0.05$). **Results:** a total of 37.5% (n = 18) of the sample exhibited some type of joint sound. Among these children, 72.2% (n = 13) exhibited a click/pop and 27.8% (n = 5) exhibited crepitation. Of the 18 children who presented some typical noise, 66,7% (n=12) were also bruxism. A statistically significant association was found between joint sounds and bruxism. No association was found between joints sounds and gender. However, a significant association was found with regard to age, as a greater percentage of children at six years of age had no joint sounds. **Conclusion:** the present data demonstrate an association between bruxism and joint sounds in children.

KEYWORDS: Bruxism; Temporomandibular Joint; Child; Noise

INTRODUCTION

Bruxism (clenching and/or grinding of one's teeth) is often found in children and adolescents. This habit can have harmful effects on the teeth, periodontium, masticatory muscles and temporomandibular joint (TMJ)[1,2]. Bruxism can also have behavioral and psychological effects[3].

The consequences of bruxism to the TMJ are directly related to the changes that occur in the masticatory muscles. Pain and discomfort in this joint are the main complaints of affected individuals, along with difficulty chewing, uncoordinated jaw movements, joint luxation, degenerative alterations in the joint, restricted/deviated mandibular movements and joint sounds[4,5].

Studies have demonstrated sounds in the TMJ are frequent in children with temporomandibular disorder (TMD)[6-9]. However, there is little evidence of this sign in children with bruxism. Moreover, divergent findings are reported regarding the relationship between TMD and bruxism in this population[9].

(1) Universidade Nove de Julho – UNINOVE, São Paulo, SP, Brasil.

(2) Associação Paulista de Cirurgiões-Dentistas, São Paulo, SP, Brasil.

(3) Programa de Mestrado e Doutorado em Ciências da Reabilitação, Universidade Nove de Julho (UNINOVE), São Paulo, SP, Brasil.

Auxiliary sources: PubMed, MedLine, EBSCO and Scielo databases.

Conflito de interesses: inexistente

Joint sounds are classified as a single, explosive noise (click or pop) or a continuous grating noise (crepitus) that occurs when the mouth is opened and/or closed. There is consensus in the literature that clicks are generally the result of the impact between the mandibular condyle and the temporal component of the TMJ after its rapid passage through the posterior band of the joint disc.[10] Crepitus is found in more advanced stages of TMD and is generally associated with a degenerative condition[10].

Considering the consequences of these aspects to the TMJ, the aim of the present study was to investigate the possible relationship between bruxism and joint sounds in children. The results could allow the establishment of measures aimed at preventing damage to the TMJ.

METHODS

An observational, descriptive, cross-sectional trial was conducted with a convenience sample of 48 children in the mixed dentition phase. This study received approval from the Human Research Ethics Committee of the university under process number nº 228.746. All legal guardians received clarifications regarding the objectives and procedures and signed a statement of informed consent agreeing to the participation of their children in compliance with Resolution 196/96 of the Brazilian National Health Board.

The participants were recruited from the pediatric clinic of the School of Dentistry of University Nove de Julho (Brazil) and were allocated to two groups: Group I – 21 children with some sign or symptom of bruxism based on the criteria of the American Academy of Sleep Medicine:[11] parental report of clenching and/or grinding of the teeth and incisal and/or occlusal tooth wear; Group II – 27 randomly selected children with no signs or symptoms of bruxism. For both groups, an additional inclusion criterion was the presence of the first permanent molars in the Angle Class I occlusal relationship. The exclusion criteria were neurological disorder, currently undergoing orthodontic treatment, malocclusion (open bite, crossbite or crowding), facial asymmetry and systemic adverse health condition.

The clinical evaluation was performed by a single examiner who had undergone a training exercise. The examiner was blinded to the allocation of the children to the different groups. The analysis of joint sounds involved a lateral and dorsal extra-auricular exam for the occurrence of a click/pop and crepitus. Manual palpation of both TMJs was performed, along with auscultation with the aid of a stethoscope. The participant was asked to open and close his/her mouth several times upon verbal commands (“open” and “close”) given by the examiner to determine the absence or presence of joints sounds and classify the type of sound in affirmative cases. Each child performed the different movements at least three times. When one or more signs were detected by auscultation, the child was classified as positive for joint sounds.

Manual palpation of the masticatory muscles and the evaluation of the TMJ followed the recommendations of Pertes and Gross[12]. Palpation was performed as a complement to the clinical evaluation for the analysis of muscle conditions.

Statistical analysis was conducted using the SPSS version 20.0 (IBM, USA). Descriptive analyses were carried out for all variables. The chi-square test was used to test the association between joint sounds/type and the other variables (bruxism, age and sex). The level of significance was set to 5% ($p < 0.05$) for all analyses.

RESULTS

Forty-eight children aged six to nine years were examined [28 males (58.3%) and 20 females (41.7%)]. A total of 43.7% (n = 21) of the sample were classified with bruxism. A total of 37.5% (n = 18) had joint sounds and 62.5% (n = 30) exhibited no sounds during any of the auscultations. Among those with joint sounds, 72.2% (n = 13) exhibited a click/pop and 27.8% (n = 5) exhibited crepitus.

A statistically significant association was found between joint sounds and bruxism, as 66.7% of the children with joint sounds (n = 12) also had bruxism (Table 1). No association was found between joints sounds and sex. However, a significant association was found with regard to age, as a greater percentage of children at six years of age had no joint sounds (Table 2).

Table 1 – Distribution of bruxism and joint sounds in sample

Bruxism			Joint sounds		Total	*p*-value
			Absent	Present		
	Absent	n	21	6	27	0.014[a]*
		%	77.8%	22.2%	100.0%	
	Present	n	9	12	21	
		%	42.9%	57.1%	100.0%	
Total		n	30	18	48	
		%	62.5%	37.5%	100.0%	

[a] χ^2 test = 6.146
*statistically significant (p < 0.05)
Chi-square test for evaluation of association between joint sounds and bruxism

Table 2 – Distribution of joints sounds according to sex and age

			Joint sounds		Total	*p*-value
			Absent	Present		
Sex	Male	n	18	10	28	0.498
		%	64.3%	35.7%	100.0%	
	Female	n	12	8	20	
		%	60.0%	40.0%	100.0%	
Total		n	30	18	48	
		%	62.5%	37.5%	100.0%	
Age	6 years	n	20	5	25	0.028[a]*
		%	80.0%	20.0%	100.0%	
	7 years	n	2	4	6	
		%	33.3%	66.7%	100.0%	
	9 years	n	8	9	17	
		%	47.1%	52.9%	100.0%	
Total		n	30	18	48	
		%	62.5%	37.5%	100.0%	

[a] χ^2 test = 6.146
*statistically significant (p < 0.05)
Chi-square test for evaluation of association between joint sounds and variables sex and age

DISCUSSION

Signs and symptoms of TMD can develop in childhood, the prevalence and severity of which tend to increase with age[13]. Considerable variability is found in the prevalence of bruxism in children depending on the method used for the diagnosis of this condition[14]. However, Serra-Negra et al.[1] found that at least 35.3% of a sample of Brazilian children had some sign of bruxism. Garcia et al[15]. report a prevalence rate of 40% in preschool children aged three to six years, 17% among those aged six and seven years and 24% among those aged eight and nine years. In the present study, the prevalence rate of bruxism was 43.7%.

Bruxism is characterized by clenching and/or grinding one's teeth, which leads to incisal or occlusal tooth wear[16]. However, divergent findings are reported regarding joint sounds in individuals with bruxism. In the present study, a significant association was found between these two conditions. This association may be explained by the parafunctional activity, which is common in children and alters the movements of the jaw and its functions.

Okeson[16] found that many children were aware of sounds in the TMJ, which were confirmed by clinical exams. In other studies, the authors report an increase in the frequency of joint sounds with the greater degree of severity of bruxism[17] and that joint sounds are a significant predictor of TMD[18]. Epidemiological studies and an investigation

involving a convenience sample suggest a strong relationship between bruxism and TMD[19]. Petit et al.[20] report that the prevalence of bruxism increases significantly with age. Huang et al.[21] suggest that sleep bruxism may be one of the factors of TMD. Molina et al.[22] found an association between self-reported bruxism and sounds in the TMJ. According to Morrow et al.[23], TMD often results in pain, joint sounds and limited condyle movements when opening and closing the mouth. Sounds in the TMJ is a frequently reported symptom and a clinically proven sign in epidemiological investigations[24]. Joint sounds are related to structural and/or functional changes in the biomechanics of the TMJ and can even be indicative of degeneration of the joint[9,10,25].

In the present study, joint sounds were associated with age. These sounds stem from changes in the shape of the TMJ that begin to occur at approximately six years of age. However, it is not known whether joint sounds subsequently develop as pathological symptoms. Moreover, these sounds often occur in children with no other signs or symptoms of TMD. The clicking sound occurs due to changes in the location of the joint disc in the fossa of the temporal bone, indicating that the disc was in a forward position and returned to its correct position during the vertical movement of the jaw[9]. Studies have demonstrated that crepitus is related to the progression of the anterior displacement of the disc, with internal derangement of the TMJ in severe cases[9,10,16]. Crepitus occurs in cases of osteoarthrosis of the TMJ, which explains the low prevalence of this joint noise in the present sample.

CONCLUSION

The present findings demonstrate an association between bruxism and joint sounds in children. Lower prevalence rates of joint sounds were found in children aged six and seven years in comparison to those aged eight and nine years. This finding suggests that joint sounds in children with bruxism may be associated with the progression and severity of symptoms.

RESUMO

Objetivo: avaliar se há relação entre bruxismo e presença de ruídos articulares em crianças. **Métodos:** participaram do estudo 48 crianças entre 6 e 9 anos atendidas na Clínica Infantil da Faculdade de Odontologia da Universidade Nove de Julho. Foram selecionadas 21 crianças com bruxismo e 27 crianças no grupo controle. Um único examinador previamente treinado e "cego" em relação aos grupos realizou exame de palpação manual e auscultação bilateral das Articulações Temporomandibulares com a utilização de estetoscópio, extra-auricular lateral e dorsal para a análise dos ruídos articulares, diferenciando-os em crepitação e estalidos. Foi realizado o número mínimo de 3 repetições nas mensurações dos ruídos para cada criança. Foram realizadas as análises descritivas de todas as variáveis e o teste qui-quadrado foi utilizado para avaliar a associação entre as variáveis, adotando-se um nível de significância de 5%. **Resultados:** em relação à presença de ruído 37,5% (n=18) apresentaram algum tipo de ruído articular, sendo que 72,2% (n=13) apresentaram estalido e 27,8% (n=5) apresentaram crepitação. Das 18 crianças que apresentaram algum tipo de ruído, 66,7% (n=12) também eram bruxistas. Foi observada associação estatisticamente significante entre a presença de ruído e bruxismo. Ao analisar a associação entre ruído e as variáveis gênero e idade, o grupo estudado não houve associação entre ruído e gênero, porém em relação à idade, houve uma maior porcentagem de crianças sem a presença de ruído articular aos 6 anos de idade, sendo estatisticamente significante. **Conclusão:** os dados do presente estudo mostraram associação entre bruxismo e ruídos articulares em crianças.

DESCRITORES: Bruxismo; Articulação Temporomandibular; Criança; Ruído

REFERENCES

1. Serra-Negra JM, Paiva SM, Seabra AP, Dorella C, Lemos BF, Pordeus IA. Prevalence of sleep bruxism in a group of Brazilian schoolchildren. Eur Arch Paediatric Dent. 2010;11(4):192-5.

2. 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.

3. Ferreira-Bacci A do V, Cardoso CL, Díaz-Serrano KV. Behavioral problems and emotional

stress in children with bruxism. Braz Dent J. 2012;23(3):246-51.
4. Fernandes G, Franco AL, Siqueira JT, Gonçalves DA, Camparis CM. Sleep bruxism increases the risk for painful temporomandibular disorder, depression and non-specific physical symptoms. J Oral Rehabil. 2012;39(7):538-44.
5. Thilander B, Rubio G, Pena L, de Mayorga C. Prevalence of temporomandibular dysfunction and its association with maloccusion in children and adolescents: an epidemiologic study related to specified stages of dental development. Angle Orthod. 2002;72(2):146-54.
6. Vanderas AP, Papagiannoulis L. Multifactorial analysis of the aetiology of craniomandibular dysfunction in children. Int J Paediatr Dent. 2002;12(5):336-46.
7. 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):108-12.
8. 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.
9. Barbosa T de S, Miyakoda LS, Pocztaruk R de 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.
10. Farsi NM. Symptoms and signs of temporomandibular disorders and oral parafunctions among Saudi children. J Oral Rehabil. 2003;30(12):1200-8.
11. Thorpy MJ. International classification of sleep disorders (ICSD). Diagnostic and coding manual revised. Diagnostic Classification Steering Committee. Rochester, Minnesota: American Sleep Disorders Association. 2005.
12. Pertes RA, Gross SG. Clinical management of temporomandibular disorders and orofacial pain. Quintessence Books, 1995.
13. Nagamatsu-Sakaguchi C, MInakuchi H, Clark GT. Relationship Between the Frequency of Sleep Bruxism and the Prevalence of Signs and Symptoms of TMD. J Int Prost. 2008;21(4):292-8.
14. Manfredini D, Restrepo C, Diaz-Serrano K, Winocur E, Lobbezzo F. Prevalence of sleep bruxism in children:a systematic review of the literature. J Oral Rehabil. 2013;40(8):631-42.
15. Garcia PP, Corona SA, Santos-Pinto A, Sakima T. Verificação da incidência de bruxismo em pré-escolares. Odontol Clin. 1995;5:119-22.
16. Okeson JP. Mechanics of Mandibular Movement. In : Dolan J, Pendill J, editors. Management of TMD and occlusion. 6ª ed. St Louis (MO): Mosby; 2008. p. 151-9.
17. Baba K, Haketa T, Sasaki Y, Ohyama T, Clark GT. Association between masseter muscle activity levels recorded during sleep and signs and symptoms of temporomandibular disorders in healthy young adults. Journal of Orofacial Pain. 2005;19(3):226-31.
18. Egermark I, Carlsson GE, Magnusson T. A 20-year longitudinal study of subjective symptoms of temporomandibular disorders from childhood to adulthood. Acta Odontol Scand. 2001;59:40-8.
19. Schiffman EL, Fricton JR, Haley D. The relationship of occlusion, parafunctional habits and recent life events to mandibular dysfunction in a non-patient population. J Oral Rehabil. 1992;19:201-23.
20. Petit D, Touchette E, Tremblay RE, Boivin M, Montplaisir J. Dyssomnias and parasomnias in early childhood. Pediatrics. 2007;119:1016-25.
21. Huang GJ, LeResche L, Critchlow CW, Martin MD, Drangsholt MT. Risk factors for diagnostic subgroups of painful temporomandibular disorders (TMD). J Dent Res. 2002;81:284-8.
22. Molina OF, dos Santos J Jr, Nelson S, Nelson SJ, Nowlin T. A clinical study of specific signs and symptoms of CMD in bruxers classified by the degree of severity. Cranio. 1999;17:268-79.
23. Morrow D, Tallents RH, Katzberg RW, Murphy WC, Hart TC. Relationship of other joint problems and anterior disc position in symptomatic TMD patients and in asymptomatic volunteers. J Orofac Pain. 1996;10:15-20.
24. Emodi-Perlman A, Eli I, Friedman-Rubin P, Goldsmith C, Reiter S, Winocur E. Bruxism, oral parafunctions, anamnestic and clinical findings of temporomandibular disorders in children. Journal of Oral Rehabilitation. 2012;39:126-35.
25. Baba K, Haketa T, Sasaki Y, Ohyama T, Clark GT. Association between masseter muscle activity levels recorded during sleep and signs and symptoms of temporomandibular disorders in healthy young adults. Journal of Orofacial Pain. 2005;19(3):226-31.

Received on: January 20, 2014
Accepted on: May 03, 2014

Mailing address:
Sandra Kalil Bussadori
Avenida Pompéia, 2186, Sumarézinho
São Paulo – SP – Brasil
CEP: 05022-001
E-mail: sandra.skb@gmail.com