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Association between temporomandibular disorder and bruxism among children aged 5 to 11 years

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Summary

Background: Temporomandibular disorder (TMD) is a multifactor condition, with bruxism (teeth clenching/grinding) as one of the triggering factors, leading to isolated or complex problems in the stomatognathic system. The aim of the present study was to investigate the association between TMD and bruxism in male and female children aged 5 to 11 years.

Material/Methods: An observational, cross-sectional study was carried out with 104 children [60 males (57.69%) and 44 females (42.31%)] between 5 and 11 years of age (mean: 7.54±1.5 years). The Fonseca Patient History Index was used for the diagnosis and determination of TMD. A clinical evaluation performed by a dentist and a physical therapist was used to identify the presence or absence of TMD and bruxism, the results of which were compared to the findings of the questionnaire, which provided the degree of TMD.

Results: Among the 104 participants, 52 (50%) exhibited no signs or symptoms of TMD, whereas 46 (44.23%) exhibited mild TMD and six (5.77%) exhibited moderate TMD. Thirty children (28.85%) had the habit of teeth clenching/grinding. A significant association was found in boys between the degree of TMD and bruxism ($p<0.001$). Girls had a 3.35-fold greater chance of exhibiting higher degrees of TMD.

Conclusions: There was a correlation between TMD and bruxism among the children studied. The boys displayed an increase in TMD with this parafunctional habit and the girls proved more vulnerable to higher degrees of TMD.

key words: **child • temporomandibular joint dysfunction syndrome • questionnaires • bruxism**

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BACKGROUND

Temporomandibular disorder (TMD) is a blanket term for a set of disorders of the muscles of mastication and the temporomandibular joint (TMJ) [1] characterized by joint noises, limitations or deviations in mandibular movements and pain symptoms in the pre-auricular region, TMJ and/or muscles of mastication [2,3]. TMD has a multifactor etiology [4,5] related to developmental abnormalities, trauma to the mandible and/or TMJ, occlusal abnormalities and interferences, an imbalance between neuromuscular, psychological and anatomic factors and micro-trauma caused by parafunctional oral habits [5,6]. Another factor associated with TMD is the habit of clenching and grinding the teeth, which is known as bruxism [7].

Bruxism is a parafunctional habit that can affect children and adults alike and may occur in a conscious or unconscious manner during waking hours or sleep [7]. A number of studies [8,9] report that bruxism is a complex, multifactor disorder often associated with psychological factors, occlusal abnormalities or both. The prevalence of this condition among children ranges from 8.5% to 43% [10] and is more frequent during sleep (nocturnal bruxism) [11,12]. Bruxism affects the muscles of mastication as well as the physiopathology of the stomatognathic system and orofacial structures [9]. Knowing the possible variations and related functional changes, it is possible to develop a physiotherapy and dental treatment plan that will improve the patient's symptoms.

The aim of the present study was to investigate the association between TMD and bruxism in boys and girls aged 5 to 11 years.

MATERIAL AND METHODS

This study received approval from the Human Research Ethics Committee under process no. 245845/09. All parents/guardians of the participants received information and clarifications regarding the study and signed informed consent forms authorizing the participation of the volunteers in the study.

An observational, cross-sectional study was carried out with 104 children enrolled at a private school. The inclusion criteria were age between five and 11 years and regular enrollment in school. The exclusion criteria were neurological conditions, syndromes, craniofacial malformations and refusal to participate in the study.

Anthropometric characteristics were determined using a digital anthropometric scale (Lider®, model P150C). The children were then examined by a dentist for the identification of the presence of bruxism based on the diagnostic criteria of the Academy of Sleep Medicine [10]. For such, the presence of wear on the incisal edges of the anterior teeth and the cuspids of the posterior teeth was assessed, along with occlusal abnormalities.

The Fonseca Patient History Index [13] was used for the diagnosis and determination of the degree of TMD. This questionnaire is made up of 10 items addressing difficulty opening the mouth and moving the mandible, the presence of headaches and pain in the neck and TMJ and the habit of teeth clenching/grinding. Each question has 3 response options: "No" (0 points), "Sometimes" (5 points) and "Yes" (10 points). The sum of the points characterizes the degree of severity of TMD, which is classified as severe (70 to 100 points), moderate (45 to 65 points), mild (20 to 40 points) and absence of TMD (0 to 15 points).

Statistical analysis

The SAS program for Windows (v. 9.1.3) was used for the statistical analysis. The chi-square test and Fisher's exact test were used when appropriate to determine associations between qualitative variables. Logistic regression analysis was performed, with the calculation of odds ratios and 95% confidence intervals (CI). The level of significance was set at 5% ($p<0.05$).

RESULTS

Table 1 displays the distribution of the children with regard to gender, age, height, weight and TMD classification. Among the 104 children evaluated, 60 (57.69%) were males and 44 (42.31%) were females.

The Fonseca Index score categorized 46 participants (44.23%) with mild TMD, 6 (5.77%) with moderate TMD and 52 (50%) without TMD. There were no cases of severe TMD. With regard to bruxism, 28.85% of the overall sample exhibited the habit of teeth clenching/grinding and 71.15% did not exhibit this parafunctional habit. Fisher's exact test revealed a significant association between the absence of TMD and the male gender ($p<0.005$) (Table 2).

The degree of TMD was analyzed through logistic regression (odds ratios) according to gender and bruxism. Both variables exerted an influence over the degree of TMD. The female gender had a 3.35-fold greater chance of exhibiting higher degrees of TMD and children with the habit of bruxism had a 4.3-fold greater chance of exhibiting higher degrees of TMD. Weight, height and age were not significantly associated to the degree of TMD (Table 3).

DISCUSSION

It is estimated that 20% to 25% of the population has symptoms of TMD and nearly 70% exhibit signs of this disorder at some time in life [14,15] The prevalence of TMD is widely described in the literature [16,18]. While both adults and children exhibit symptoms of TMD, the intensity of the disorder is lesser in the latter group [19]. Studies on the epidemiology of TMD report discrepant results regarding its predominance and incidence, which may be attributed to the different types of clinical questionnaires employed [20]. Patient history indexes are important assessment tools that offer scores for classifying the degree of TMD. Among the different types of questionnaires, the Fonseca Patient History Index was employed in the present study. This index has proven sensitive and comprehensible for the determination of the severity of TMD [13].

The literature reports that TMD affects females more than males [21]. The present study corroborates this finding, demonstrating that TMD is directly linked to risk factors such as depression [22], stress [23], and the influence of

Table 1. Characterization of volunteers according to degree of TMD, age and anthropometric data.

	N	Without TMD	Mild	Moderate	Age (years)	Height (m)	Weight (Kg)
Male	60	37	21	2	7.37±1.46	1.29±0.10	28.52±8.17
Female	44	15	25	4	7.77±1.54	1.31±0.10	31.04±8.69
Total	104	52	46	6	7.54±1.5	1.30±0.10	29.59±8.45

Table 2. Association between degree of TMD, bruxism and gender.

		Without TMD	Mild	Moderate
Female	With bruxism	2	8	2
	Without bruxism	13	17	2
	Total	15	25	4
Male	With bruxism	7	9	2
	Without bruxism	30*	12	0
	Total	37	21	2

* Statistically significant association (p<0.05).

reproductive hormones among women [24]. The young population in the present study exhibited characteristics found in the adult population, which evidences the need for further studies addressing the pediatric population in order to clarify these associations.

A total of 52% of the children exhibited mild to moderate TMD and nearly 30% of the overall sample exhibited the habit of bruxism [25]. Cheifetz et al. [26] analyzed 854 children, 38% of whom exhibited bruxism and the majority of the overall sample was female, unlike the present study, in which the majority was male. Other studies also report a greater prevalence of bruxism among females [7]. However, a greater number of boys exhibited bruxism in the present study (Table 2).

Girls were more affected by signs and symptoms of TMD and had a 3.35-fold greater chance of exhibiting higher degrees of TMD, corroborating previous studies that reported a greater prevalence of this disorder in females [19,27]. This finding may be related to greater tissue flaccidity, increased estrogen levels or a higher degree of emotional stress in females [21].

TMD may be caused by different etiological factors, including bruxism, [7,28] leading to an imbalance in the postural, musculoskeletal and psychological systems. It cannot be affirmed whether these alterations are the cause or consequence of bruxism. However, there is an increase in the severity of TMD among children with the habit of bruxism. [29,30]. In the present study, children with this parafunctional habit had a 4.3-fold greater chance of exhibiting higher degrees of TMD.

Conclusions

Based on the results of the present study, one may conclude that there is an association between TMD and bruxism in children. While females proved more vulnerable to higher degrees of TMD, the present study also demonstrated an increase in the severity of TMD among children of both genders who exhibit the habit of bruxism.

Table 3. Odds ratios for degree of TMD according to gender and bruxism.

Variable	Estimate	Standard error	p-value	Odds Ratio (95% CI)
Female	0.60	0.21	0.0044	3.35 (1.46–7.7)
With bruxism	0.73	0.23	0.0017	4.29 (1.73–10.6)

Conflict of interest

The authors declare no conflicts of interest.

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