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ORIGINAL ARTICLE

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Temporomandibular disorder in children at deciduous and mixed denture

Disfunções temporomandibulares em crianças com dentição decídua e mista

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ABSTRACT

The temporomandibular joint (TMJ) plays an important role in the function of stomatognathic system. The acronym TMD – Temporomandibular disorder – is a general term for a series of signs and symptoms involving the masticatory muscles, TMJ, and associated structures. TMDs have a multifactorial etiology despite that many controversies still exist on this subject. Structural factors as trauma, malocclusion, systemic hypermobility, oral parafunctions, and emotional conditions (stress, anxiety, and depression) may trigger TMDs appearance. **Objective:** This study aimed to evaluate the signs and clinical symptoms of TMDs in patients treated at the School of Dentistry of the Institute of Science and Technology of São José dos Campos – UNESP - SP. **Material and Methods:** Fifty patients, both genders, aged between five and thirteen years were examined through muscle palpation and auscultation. Intra and extraoral examinations were performed, observing occlusion interference, denture type, protrusion or retrusion of the mandible, open bite or crossbite, edge-to-edge bite relation, midline shifts, limitation of mouth opening, and mandible shift during mouth opening and closing. Anamnesis comprised questions on the child's habits and symptoms noticeable by the parents or legal guardians, information on the child's personality and mood. **Results:** The obtained data were analyzed through percentage and qualitative analysis. **Conclusion:** It can be concluded that children exhibited signs and symptoms of TMDs, but TMDs presence cannot be affirmed in the studied sample; stress or altered behavior influenced on the presence of the signs and symptoms in the TMJ area.

KEYWORDS

Temporomandibular joint; Mixed dentition; Primary dentition; Temporomandibular joint dysfunction syndrome.

RESUMO

A Articulação Temporomandibular (ATM) tem grande importância no funcionamento do sistema estomatognático. A expressão DTM – Disfunção Temporo Mandibular – é um termo genérico para uma série de sinais e sintomas que envolvem os músculos mastigatórios, a ATM e estruturas associadas. Pode-se considerar que as DTMs apresentam etiologia multifatorial, apesar de muitas controvérsias ainda existirem sobre o assunto. Fatores estruturais como trauma, maloclusões, hipermobilidade sistêmica, parafunções orais e condições emocionais como: estresse, ansiedade e depressão; podem provocar o aparecimento das DTMs. **Objetivo:** O objetivo desta pesquisa foi avaliar sinais e sintomas clínicos e subjetivos em pacientes que se encontravam em tratamento na Faculdade de Odontologia do Instituo de Ciências e Tecnologia de São José dos Campos – UNESP - SP. **Material e Métodos:** Para sua execução foram examinados (palpação da musculatura e auscultação) de t50 (cinquenta) pacientes, de ambos os sexos, com idade entre 5 (cinco) e 13 (treze) anos, acompanhados por responsável legal. Foram realizados exames clínicos intra e extraorais, observando: interferência de oclusão, tipo dentição, protrusão ou retrusão de mandíbula, mordida aberta ou cruzada, relação topo a topo, desvios de linha média, limitação de abertura de boca e desvio de mandíbula durante abertura e fechamento. **Resultados:** Realizou-se anamnese envolvendo questões como hábitos da criança e sintomas perceptíveis pelos responsáveis, assim como informações sobre sua personalidade e temperamento. **Conclusão:** Conclui-se que: existem sinais e sintomas em crianças, Não podemos afirmar a existência de DTMs na amostra estudada, O estresse ou comportamentos alterados influem na presença de sinais e sintomas na região de complexo articular.

PALAVRAS-CHAVE

Articulação temporomandibular; Dentição Mista; Dentição Primária; Síndrome da disfunção da articulação Temporomandibular.

INTRODUCTION

The temporomandibular joint (TMJ) plays an important role in the function of the stomatognathic system because TMJ is a bilateral joint with single simultaneous movements for each side. Also, TMJ enables the large movement of mandible around a fixe bone – the temporal. Other aspect of relevance is the interdependence with tooth occlusion of both jaws, resulting in singularity and complex function. [1].

Currently, the acronym TMD – Temporomandibular disorder – is a general term for a series of signs and system involving the masticatory muscles, TMJ, and associated structures [2]. According to the literature [3-9], TMDs have a multifactorial etiology, although the literature lacks consensus on this subject.

Structural factors (trauma, malocclusion, and oral parafunctions) and emotional conditions (stress, anxiety, and depression) can trigger TMDs [10-15]. The oclusal interferences and the psychological factors play a more important role in DTMs etiology than do the other variables[3].

The most common TMD signs and symptoms are listed: TMJ noise and click, mandible shifting during mouth opening, limitation in maximum mouth opening, condilar asymmetry, TMJ pain, facial pain, headache, incisal edge wearing, among others. These events may occur alone or combined. [2-9,16,17]

Currently, most studies on TMD reveal that the prevalence of signs and symptoms is occurring in children and teenagers and tend to progress with the beginning of adult life. Epidemiologic studies on children show TMD prevalence as high as that occurring in adults. [2,3-8]

According to Thilander et al. [4], the craniofacial development and formation determines the intercuspal positions and their relation with both the muscle and the jaws. During puberty, the bone and muscle growth may not follow the same development pattern resulting in discrepancies between muscle and bones. Discrepancies in tooth eruption may still influence on the intermaxillary relationship, i.e., they negatively interfere in oclusal stability. Fortunately, moderate to severe signs and symptoms are not frequent in children and functional treatments are unnecessary in most of the cases. Due to TMD multifactorial etiology, both in children and adults, the prevention requires a decision on the proper time of orthodontic treatment beginning. This is a very complex decision, which implies not only in the malocclusion treatment during deciduous and mixed dention, but also in the occlusion development of the permanent dentition because the orthodontic treatment may either cause or worsen the TMDs [4,7,8,16-18]. The new knowledge on TMDs clinical signs and symptoms has an important role in the prognosis of orofacial problems because recent studies reveal the greatest association between oral parafunctions, malocclusions, and TMDs. [5,17-20]

Notwithstanding, the role of oclusal factors in the development of TMDs signs and symptoms still lacks consensus. Some studies do not find strong evidence to support the idea that oclusal factors are part of TMDs etiology [21-22]. However, most of the studies affirm that oclusal disturbs may cause or are closely related to TMDs, and consequently, these studies include oclusal adjustment as one of TMDs treatments [5,10].

Laskin et al. [23] proposed a classification for the etiological factors, as follows: predisposing, initiators, and perpetrators [24]. Among the predisposing factors, these authors listed the psychological (personality and behavior) and structural factors (occlusal features, large overbite, loss of molars, and open bite). Such characteristics increase the risk of TMD development. The initiator factors involve trauma, parafunctional habits,

and adverse factors. Finally, muscle stress, metabolic problems, and mainly emotional and social problems comprised the perpetrator factors. According to these authors, it is worth noting that these factors may interact and/or act together on TMDs development.[6]

Moreover, many studies suggest other aspects that may increase or decrease TMDs prevalence in children and teenagers, such as: weariness of incisal edges, tooth alterations, and compromised masticatory movements [12]. Patient's gender and origin may reveal different prevalences in similar studies. [25]

Magnusson, Carlsson and Egermarki [7-17] investigate the correlation between subjective clinical signs and symptoms of TMDs and need of functional treatments. Through clinical examination and questionnaires, the authors found no statistically significant change. The most common clinical sign was muscle pain after palpation, followed by TMJ clicks. Occlusal weariness was the most incident sign in patients aged 25 years in relation to occlusal interferences. The treatment need of each case was evaluated and 25% of the sample required any type of functional treatment.

Vanderas [26] conducted a study aiming to evaluate the synergic effect of malocclusion associated to oral parafunctions in TMDs. Considering the psychological aspects, the children were divided into two groups: with and without unpleasant events throughout life. The author concluded that the effect of certain oclusal forces and oral parafunctions are related to clicks and symptoms of TMDs in both groups. The muscle tenderness and TMJ signs were only found in calmer children. The group of children experiencing tenderness did not show correlation of TMJ/muscle tenderness with malocclusion and parafunctions, that is, other etiological factor accounted for the development of such symptoms.

Bonjardim et al. [2] analyzed the presence of signs and symptoms of TMDs in children with deciduous dentition who do not use orthodontic appliances. Through clinical examination and questionnaire applications, the authors verified the presence of TMDs signs and symptoms. The results suggested that 34.34% of the children exhibited such signs and symptoms. Of the children with TMDs signs and symptoms, 50% showed at least one clinical sign. Mandible shifting (18.18%) and headache (7.07%) was the most common sign.

Just as Tuerlings and Limme [16] associated the highest prevalence of articular noise in female patients and the effect of orthodontic treatment and the effects on TMJ [20], Thilander et al. [4] also found that females are more affected by functional disturbed of the masticatory system than males [16,17,15]. Dao and Le Resche [27] suggested that females may be more responsive to muscle and TMJ palpation, so that they appear more in DTMs studies.

This study aimed to evaluate the prevalence of TMDs, the presence of TMDs signs and subjective clinical symptoms, deleterious habits, and emotional aspects in patients treated at the Department of Collective Dentistry and Child Clinics of the School of Dentistry of São José dos Campos – UNESP.

MATERIAL AND METHODS

All parents/legal guardians read and signed a free and clarified consent form to authorize the clinical examination and the use of the information obtained through the questionnaires. Fifty children, both genders, aged between 5 and 13 years participated in the study. The questionnaire was applied to the children in the presence of the parents. The parents also answered some questions.

Extra- and intraoral examinations comprised: tooth formation, mandible protrusion or retrusion, open bite, crossbite, terminal plane, midline shifting, limitation in mouth opening, mandible shifting during

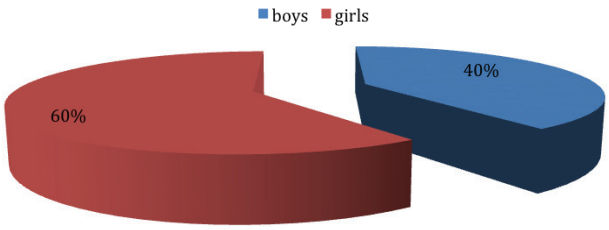
mouth opening and closing. TMJ was evaluated through palpation and auscultation. Palpation was performed on TMJ and soft tissues, especially on the muscles related to the joint complex to verify tenderness and possible disc displacements. Auscultation aimed at detecting strange noises during mouth opening, closing, and lateral movements. A pilot study with 10 children was performed aiming to the calibration of the examiner.

Also, a comprehensive anamnesis was carried out comprising question on oral habits, signs and/or symptoms perceived both by the child and the parents/legal guardians. The child behavior was dichotomized in calm/quiet – anxious/stressed.

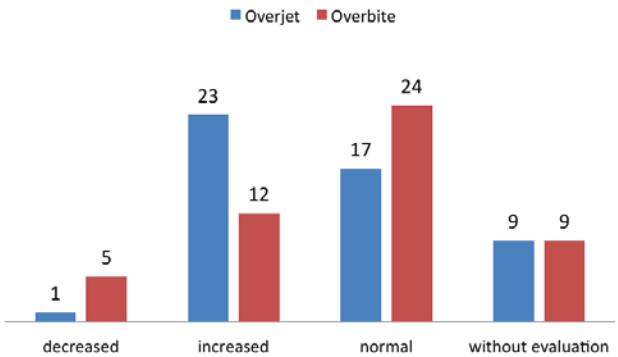
Data was submitted to percentage and qualitative analyses.

RESULTS

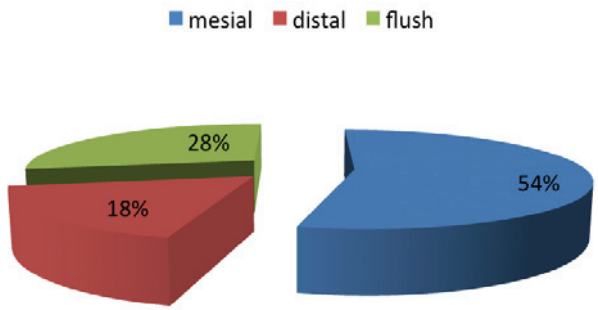
The data is presented in graphs to allow better visualization of the results.



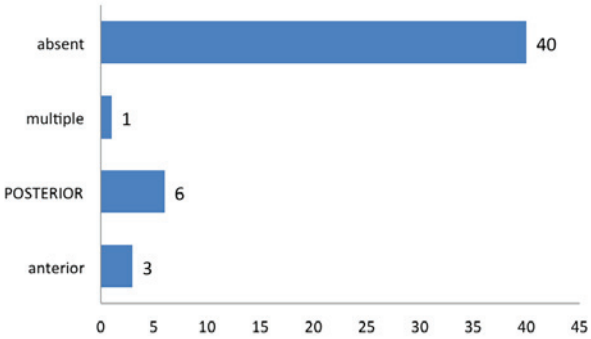
Graph 1 - Sample distribution with TMD signs and symptoms in relation to gender.



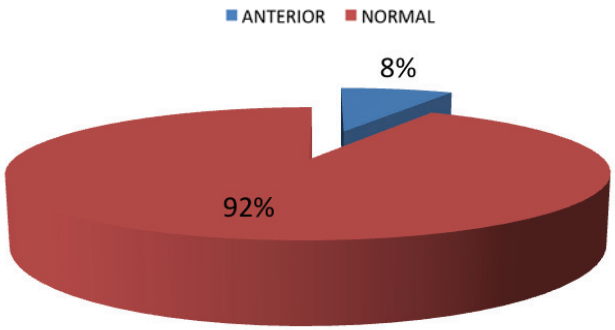
Graph 2 - Sample distribution in relation to overbite and overjet.



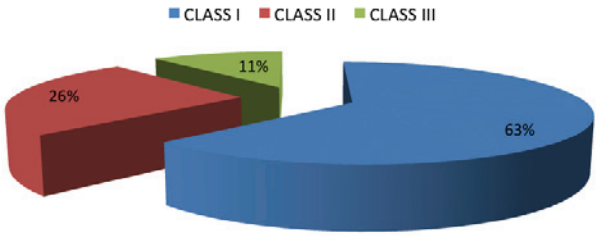
Graph 3 - Sample distribution according to terminal relation of the deciduous second molars.



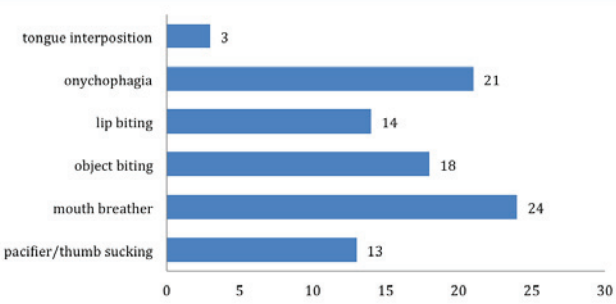
Graph 4 - Sample distribution in relation to crossbite.



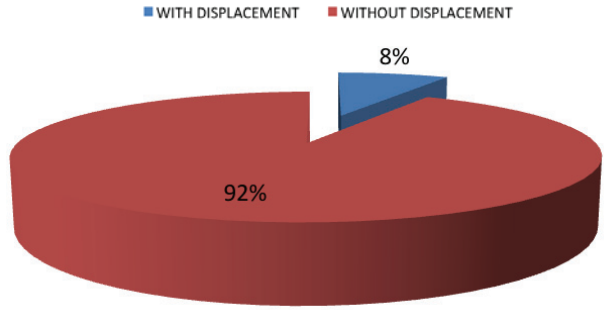
Graph 5 - Sample distribution showing presence of open bite.



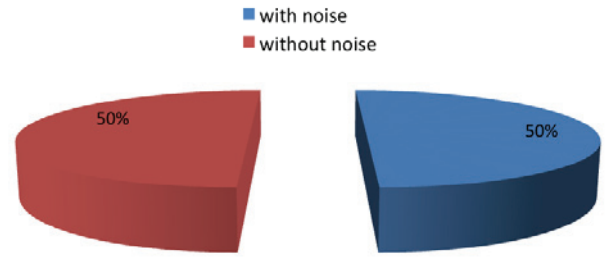
Graph 6 - Sample distribution showing presence of open bite.



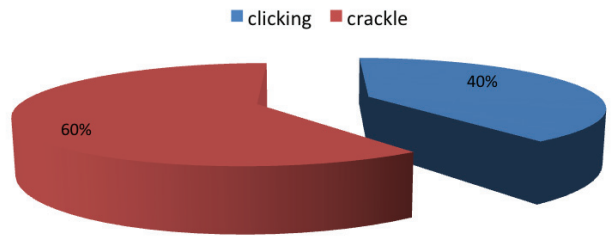
Graph 7 - Sample distribution according to deleterious habits.



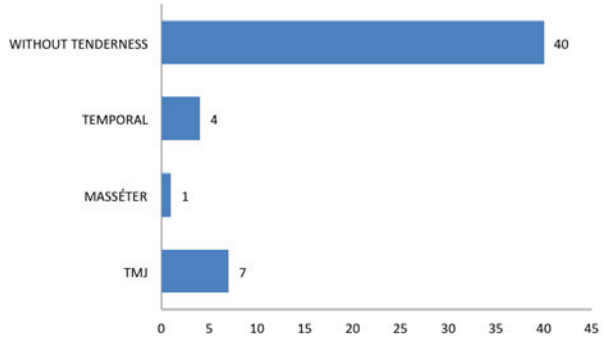
Graph 8 - Sample distribution according to deleterious habits.



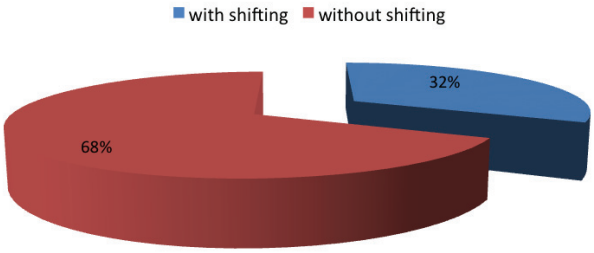
Graph 9 - Sample distribution in relation to the presence of TMJ noises.



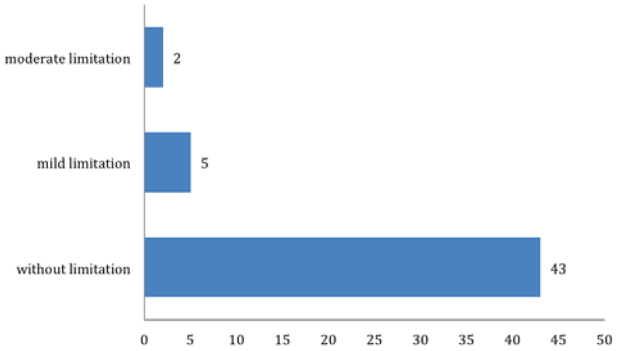
Graph 10 - Sample distribution in relation to TMJ noise types.



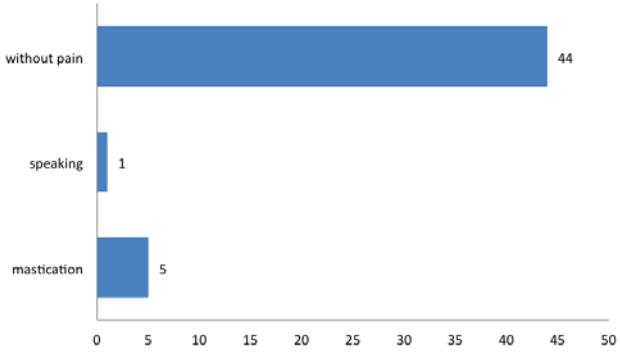
Graph 11 - Sample distribution in relation to tenderness to palpation.



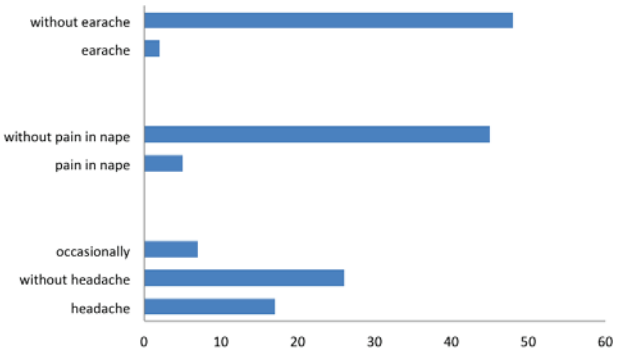
Graph 12 - Sample distribution in relation to mouth opening shifting.



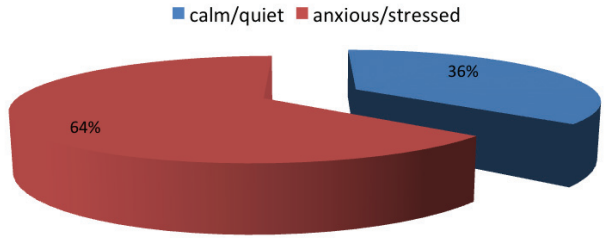
Graph 13 - Sample distribution in relation to maximum mouth opening.



Graph 14 - Sample distribution in relation to TMJ pain.



Graph 15 - Sample distribution in relation to pain.



Graph 16 - Behavior perception of the parents/legal guardians.

DISCUSSION

This study sample comprised 26 girls and 24 boys. The girls (n = 15) showed more TMDs symptoms (TMJ noises) than boys (n = 10). Therefore, we found a larger tendency towards these symptoms (headache, pain in nape, and tiredness after mastication) and signs difficulty in mouth opening, disc displacement, and TMJ noises) in girls than in boys, corroborating other studies on the literature [4,16,12,27,28], which report greater frequency of TMDs signs and symptoms in females than males. (Graph 1)

Longitudinal studies reveal that TMD sign and symptom prevalence occur both in children and adults, similarly to the results of this present study on children (Graphs 7, 8, and 9). TMDs etiology lacks consensus on the literature [8,14,27,29,30], due to the association of objective with subjective symptoms, and consequently difficult in pointing out a precise etiology.

The presence of occlusal interferences may play a role in TMDs etiology, but without consensus. Some authors state that occlusal interferences fluctuate in children, reflecting the occlusal changes during tooth development. Pahkala and Laine-Avala [31] verified that the prevalence of mesial intrusive contacts and protrusive interferences is greater in 7-year-old than in 10-year-old children, but higher in 15-year-old teenagers. Accordingly, occlusal interferences are very variable. Our results showed the association of signs and symptoms with the presence of altered overjet and overbite (Graph 2).

The loss of posterior support and lack of lateral guide during mandibular movements may be considered as other occlusal factors accounting for beginning or perpetuating TMDs [3,4] According to Thilander et al. [4], many children with caries lesions and loss of deciduous teeth exhibited TMDs associated with malocclusion. In these cases, the occlusal development is influenced by the mesial eruption of the permanent first molars, resulting in midline shifting and occlusal instability. On the other hand, Thilander, Magnusson [7,17] did not find correlation of TMDs signs and symptoms and occlusal interferences during retrusion and lateral mandibular movements. The presence of the molar relation according to Graph 3 shows that most of the study sample had a mesial and flush terminal plane, which are both favorable to normality, despite of the TMDs presence (Graphs 7, 8, and 9).

Pahkala and Quanstrom [15] aimed to stablish the relationship between malocclusion types and TMDs and found that marked overjet led to large mandibular movements, probably due to functional reasons, such as speaking articulation and bite, which may stress the masticatory muscles. Other longitudinal studies suggest that Class II malocclusion division I is the most related to TMDs. In this present study, the presence of malocclusion, and increased overjet/overbite influenced the presence of TMDs signs and symptoms (Graphs 2, 3, 4, 5, and 6).

Despite many controversies, De Boever, Carlsson and Klineberg [6] reported that clinical and epidemiological studies exhibited very week correlation of TMDs signs and symptoms with occlusal interferences to stablish a relevant conclusion. We corroborate this affirmation due to the difficult in relating objective and subjective signs.

Vanderas [26] reported that malocclusion is a necessary but not sufficient factor to cause TMDs signs and symptoms. The author affirmed that malocclusion cannot act independently in the production of TMDs signs and symptoms. Moreover, oral parafunctions (tooth grinding and clenching, lip/cheeks biting) are enough to cause TMDs in children. Unlikely malocclusion, parafunctions can act independently in producing TMDs signs and symptoms[28,32,33]. In this study sample, the presence of deleterious habits (Graph 7) did not necessarily lead to TMDs signs and symptoms.

According to Thilander et al. [4], the instability of intermaxillary relation due to interferences may promote motor disturbs in the periodontium and TMJ receptors. Because the bilateralism and complexity of the masticatory system, asymmetric muscle function cause great abnormalities in the function patterns. Notwithstanding, each patient reacts differently against this aforementioned situation because of individual variables (reaction pattern, personality, and behavior). According to each person, the muscle activity altered by occlusal interferences may sooner or later cause the destruction of muscle/articular tissues. The relationship between stress/behavior disturbs and TMD presence was evident in this present study (Graphs 11, 12, 13, 14, 15, and 16).

In 1969, Laskin [23] already reported the association of muscle/TMJ tenderness and the emotional state of the patients. According to this author, the emotional conditions produce a muscle stress, which on the other hand, promoted muscle/TMJ tenderness (Graph 11). Vanderas, [26] conducted a research in which the children were divided into groups according to the behavior and demonstrated similar results to those of this present study. The group of stressed children, the muscle/TMJ tenderness was not associated with any parafunction or malocclusion type, and the emotional characteristics played a role in this tenderness [34] (Graph 11, 12, 13, 14, 15, and 16).

Because of the difficulties inherent to the understanding of the subjective variables in TMDs etiology, as well as the perception of the patients and parents/legal guardians to provide relevant data, further studies are necessary to find more conclusive findings on this issue, including multidisciplinary approaches.

CONCLUSION

Based on the results of this study, it can be concluded that:

• there are signs as TMJ/muscle tenderness to palpation, noises (crackle and clicking), difficult in opening the mouth, disc displacement; and symptoms as: headache, pain in the nape, and tiredness after mastication.

• There is evidence of TMDs in the sample studied, but it was impossible to categorize both the existence and presence of TMDs.

• Both the stress and altered behavior influence in the presence of TMDs signs and symptoms.

• Girls exhibited more TMDs signs and symptoms than boys.

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