Signs and symptoms of temporomandibular joint dysfunction in children with primary dentition

Leonardo Rigoldi Bonjardim* / Maria Beatriz Duarte Gaviao** / Fabiola Grammatico Carmagnani*** / Luciano Jose Pereira ****/ Paula Midori Castelo*****

The presence of signs and symptoms of TMD in 99 children with primary dentition was evaluated through clinical exam and a questionnaire. The results showed that 34.34% presented signs and/or symptoms of TMD. Among the children with symptoms, 50% presented at least one sign or more, differing significantly from the ones without symptoms, and from those 21.6% presented sign (p=0.0l85). The most prevalent symptom was frequent headache (7.07%) followed by jaw pain (4.04%), earache (3.03%) and difficulty in swallowing (3.03%). The most prevalent sign was jaw deviation (18.18%) followed by occlusal interferences (7.07%), asymmetric condylar movement (5.05%) and TMJ sounds (3.03%). We concluded that signs and symptoms of TMD are present in early ages, even though in a small number of children.
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INTRODUCTION

Temporomandibular dysfunction (TMD) is a generic term for a number of clinical signs and symptoms involving the masticatory muscles, the temporomandibular joint (TMJ) and associated structures.[47]

* Leonardo Rigoldi Bonjardim, DDS, MS, Postgraduate student in the Department of Physiological Sciences, Piracicaba Dental School, State University of Campinas (FOP/UNICAMP), Piracicaba, SP, Brazil.

** Maria Beatriz Duarte Gaviao, DDS, MS, PhD, Professor Department of Pediatric Dentistry, Piracicaba Dental School, State University of Campinas (FOP/UNICAMP), Piracicaba, SP, Brazil.

*** Fabiola Grammatico Carmagnani, DDS, Orthodontist, Sao Paulo, SP, Brazil.

**** Luciano Jose Pereira, DDS, Postgraduate student in the Department of Physiological Sciences, Piracicaba Dental School, State University of Campinas (FOP/UNICAMP), Piracicaba, SP, Brazil.

***** Paula Midori Castelo, DDS, Postgraduate student in the Department of Physiological Sciences, Piracicaba Dental School, State University of Campinas (FOP/UNICAMP), Piracicaba, SP, Brazil.

Address for all authors and for correspondence send to Dr. Maria Beatriz Duarte Gaviao, Faculdade de Odontologia de Piracicaba/UNICAMP, Departmento de Odontologia Infantil, Av. Limeira 901 CEP 13414-903 Piracicaba, SP, Brazil.

Voice: 55 19 3412 5368/3412 5287
Fax: 55 19 3412 5218
E-mail: mbgaviao@fop.unicamp.br

TMD was generally presumed to be a condition affecting adults; however, recently studies regarding the prevalence of signs and symptoms of TMD in children and adolescents have increased.[5,35] Epidemiological studies have reported incidences of signs and symptoms in children as high as in adults.[29,37,40,46] Most signs and symptoms are characterized as mild, and more severe dysfunction is rare.[16,38] These results, reported from cross-sectional studies of different age groups, have been corroborated by later studies.[1,13]

Even though the etiology of TMD is controversial, it is considered to be multifactorial.[17,34,49] Among the more common signs and symptoms of TMD, TMJ sounds, jaw deviation during the mouth opening, limitation in mouth opening, condylar asymmetry and TMJ pain, facial pain, headache, earache and jaw pain on function have been observed,[9,25,27] alone or in combination.[37] Occlusal interferences and psychological factors are considered more important than other variables in providing explanation for TMD in accordance to Mohlin *et al.*[36] Egermark and Thilander,[20] Mintz,[35] Verdonck *et al.*[50] Apart from the variations in severity, it has been shown that signs and symptoms of TMD increase up to middle age.[8] Furthermore, these clinical features have also been found to fluctuate when individuals are examined on different occasions.[28]

Padamsee *et al.*[41] stated that it is important to recognize the pediatric patient with a predisposition towards disorder of stomatognathic system. Thus, the aim of this study was to estimate the frequency of symptoms and signs, which could suggest functional

disturbances and diseases of the stomatognathic system among a selected group of Brazilian children aged 3 to 5 years with primary dentition, using anamnestic questionnaire and clinical examination, and to compare the findings with those from other populations.

METHODS

A sample of 99 children (3 to 5 years old) was randomly selected from Piracicaba, SP, Brazil. Children suffering from systemic health diseases, or uncooperative behavior were excluded from the examination, as were those children, who had previously had any kind of orthodontic treatment.

Written and verbal consent were obtained from parents/guardians, after they had been informed about the procedures, possible discomforts or risks, as well as the possible benefits. The research was approved by the Ethics Committee of the Dental School.

The examinations were done by two examiners from the Department of Pediatric Dentistry, Piracicaba Dental School. Prior to the beginning of the survey, both examiners held series of sessions to standardize data collection technique and methodology.

All parents/guardians were subjected to anamnestic questionnaire, since the age of the children did not permit reliable answers. The questionnaire contained questions about the following qualitative (yes or no) and quantitative (frequently, occasional, or never) aspects of:

- Headache
- Earache
- Pain in the jaw
- Pain during mastication or during mouth opening
- Difficulty in swallowing
- Problem in the mouth opening, during speaking, yawning or eating
- Noise (clicking) near the ear when the mouth is open wide
- Noise in the jaw
- Tiredness in the jaw

In order to be considered as symptoms, only headaches and earaches of unknown etiology were recorded, and they should be manifested frequently (more than once a week), as well as the other symptomatic manifestations.

After that, clinical examinations were performed, based on intra-oral and extra-oral aspects. The intra-oral examination comprised the evaluation of occlusal characteristics such as molar canine relationship, crossbite, premature teeth loss, midline deviation in habitual clenching, overbite and overjet, mandibular movements, whose details form the basis for another report, as well as the parafunctional habits.

Deviations of the mandible on opening were determined to the left or the right in accordance to Egermark-Eriksson,[15] by measuring the distance of the midline between the lower and upper central incisors, in relation to the upper midline. When the midline deviation was present in centric occlusion because of tooth movement, the appropriate position of midline was marked with a pencil marker. Any deviation of 2mm or more was recorded as a sign of temporomandibular dysfunction.

The extra-oral examination was done palpating the temporomandibular joints in order to verify the condyle movement on opening and closing (symmetric/asymmetric, synchronized/not synchronized). Besides, the temporomandibular joints were examined for tenderness, which was recorded if the child felt a difference between the right and left sides, described the palpation as painful, or the pain caused either guarding or a palpebral reflex (pain causing eyelid reaction). Palpation was performed with a standardized pressure using the middle finger. A soft but firm pressure was maintained for 2 seconds. No difference of level of pain was considered.

Examination of TMJ sounds was done as evidently audible for right and left sides without using a stethoscope.

Muscle tenderness was determined by palpation and it was recorded in the same way as a temporomandibular joint tenderness. The following muscles were palpated: the anterior and posterior portion of the temporal muscle, the superficial portion of masseter muscle, and the lateral and medial pterygoid muscles. The palpation was done bilaterally except for the lateral and medial pterygoid muscles, which were palpated individually. Unilateral palpation of the lateral and media pterygoid muscles was accomplished following the technique used by Vanderas.[48]

STATISTICAL ANALYSIS

The data were computerized and the Sigma Stat package was used for the analysis. The presence of signs and symptoms was calculated by percentage. A chi-square test with a 95% level of confidence assessed the association between signs and symptoms presented.

RESULTS

The results in relation to gender were pooled in our sample, because no significant differences between boys and girls were observed.

The percentage of signs and symptoms of TMD among the children are presented in Figure 1. According to the anamnestic questionnaire and clinical examination findings 34.34% of the children had at least one symptom and/or clinical sign. The distribution of each sign and symptom is shown in Figure 2.

Among children with symptom, 50% presented at least one or more signs, differing significantly from the ones without symptom, from those 21.6% presented sign (p=0.0185).

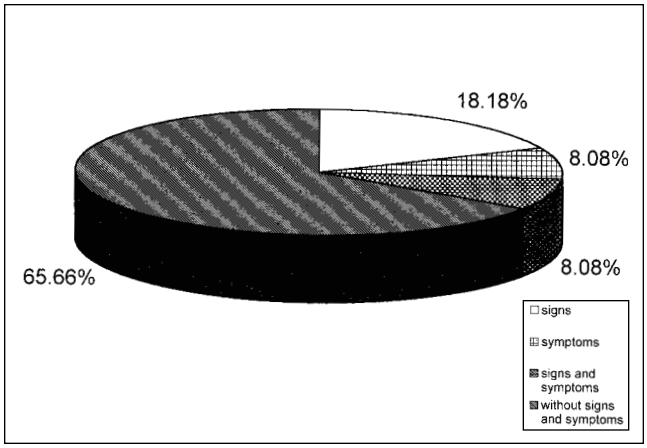

Figure 1. Percentage distribution of children with presence/absence of signs and symptoms of TMD.

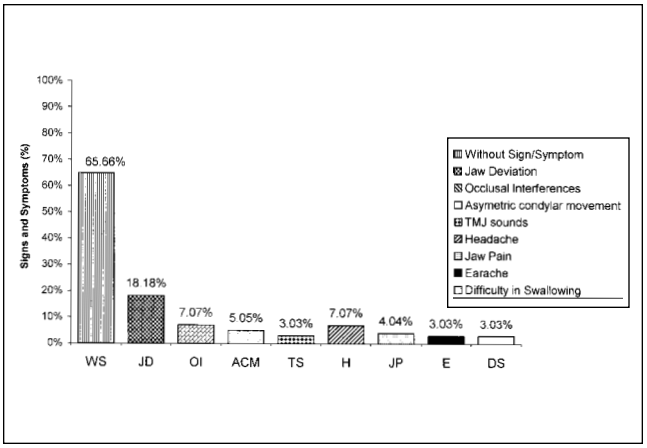

Figure 2. Signs and symptoms–percentage of sample distribution.

DISCUSSION

The etiology of TMD has been considered to be one of the most controversial issues in clinical dentistry. Cross-sectional and longitudinal studies have revealed that the prevalence of signs and symptoms of mandibular dysfunction occur in children as often as they do in adults.[46]

Riolo *et al.*[43] considered that the primary problem in all clinical research is establishing the relationship between symptoms subjectively reported by the patient, and the clinical findings objectively gathered. Accordingly, it was our concern to standardize an anamnestic questionnaire, which was answered by parents, since the age of the children did not permit reliable answers. The value of the studies based on questionnaire depends on the clarity of the phrased questions, the intelligence of the target population, exposure to the subject in question, and the revision of the questions, collectively or individually, by an experienced examiner.[55]

Signs and symptoms were observed alone or in combination. From children reporting symptom, 50% presented signs and out of those reporting no sign only 10.9% presented symptoms. Despite the age of our sample, these considerations are in agreement with the study of Locker and Slade,[32] who observed that adult subjects with symptoms, but no signs usually had relatively few symptoms and those ones with signs, but no symptoms usually had few signs. Although an anamnestic questionnaire for detecting TMD symptoms is important, and some epidemiological studies, based on data collected through questionnaires, are considered to be a cost-effective research tool for use in data collection,[45,51,56] a complete clinical examination is always mandatory to confirm subjective findings.[13] In addition, it can enhance validation by associating certain signs and symptoms, where positive relationships are supposed to exist.[55]

Other studies have also reported varying degrees of association between subjective symptoms and clinical signs. Thus, the association between the clinical sign examination and the anamnestic questionnaire is valuable. In the present study, the frequency of clinical signs was higher than reported symptoms, which led to a ratio of 2.25:1, similar to most prevalence studies, which reported the usual ratio of 2:1, in accordance with comments by Carlsson and Dc Boever.[12] Barone *et al.*[7] reported that symptoms and signs were present in 29.5% and 75.8%, respectively, in children aged 7, 11, and 16 years, given the ratio of 2.5:1.

The results in Figure 1 demonstrated that 34.34% of the sample presented at least one sign and/or symptom of TMD, and 26.26% presented at least one clinical sign, while Bemal and Tsamtsouris[9] verified this finding in 21% of the children. Nevertheless they did not evaluate occlusal interferences due to the difficulty in obtaining the required cooperation from the children, which did not occur in our sample that was properly trained before the examination. Alamoudi[4] found a percentage of 16.9% of children having one or more signs of the disorder. Our results are, however, much lower than studies of Egermark-Eriksson[15] who found a prevalence of 46.7% of children aged 7 to 15, Akeel and Al-Jasser[3] whose sample aged 8, 14, and 18 years showed a prevalence of 41%. Thilander *et al.*,[47] who verified a prevalence of 25% in children aged 5 to 17 years (in primary dentition the values were the lowest). The difference in the prevalence corroborates the considerations made by Egermark *et al.*[19] about the increase of such signs and symptoms with ageing. In the present study, 16.16% of the children presented at least one symptom of TMD, differing from Bernal and Tsamtsouris[9] and Akel and Al-Jasser,[3] who found higher values, 38% and 30% respectively. Variations of the TMD prevalence can been attributed to the differences in the ages of the studied group,[9,19] the sample size and its composition, the number of examiners, as well as definition of the diagnostic criteria.[5]

Figure 2 shows that the most prevalent sign and symptom were jaw deviation and headache with 18.18% and 7.07%, respectively. Widmaim *et al.*[54]

reported a prevalence of 16.7% of headache occurring at least 1 to 2 times per week in children aged 4 to 6, higher than our findings, as well as the prevalence of 8.4% for TMJ pain. The difference could be attributed to the interview that was done directly with the children, maybe compromising the reliable answers, since seven years has been judged to be the minimal age at which a reliable interview can be conducted.[39] About reported prevalence of the clinical signs (Figure 2), our results are similar to Widmaim *et al.*[54] in relation to jaw deviation (17.2%), but not to joint sounds (47.8%); Kritsineli and Shim[29] also reported a high prevalence of joint sounds (52.5%). We agree with the consideration of Alamoudi *et al.*[5] that this high prevalence may have been due to the fact that a stethoscope was used in both Widmalm *et al.*[54] and Kritsineli and Shim[29] studies to detect joint sounds, contrary to listening audibly, as used in the present study and others.[5,9,18] Hardison and Okeson[22] reported that different techniques for recording joint sounds reveal different findings even in the same patient. Moreover, Widmaim *et al.*[53] verified that joint sounds and TMD symptoms are common even in small children and thus demonstrate a possible early onset of TMD. They considered that the reports by the patients of TMJ sounds may have more clinical relevance than auscultation findings.

The role of occlusal factors in TMD signs and symptoms has been controversial and there is currently no universal agreement on the type of the interference that is considered detrimental to function and with a causal role in the etiology of TMD.[14] In the present study we verified occlusal interference in 7.07% of the children. Pahkala and Laine-Alava[42] verified that the prevalence of mediotrusive contacts and protrusive interferences in the sample was higher among children aged 7 than in those aged 10, but increased again by age 15. According to the authors, this fluctuation in interference most likely reflects occlusal changes during dental development. Moreover, the correlations found between occlusal interferences and TMD signs and symptoms in epidemiological and clinical studies, including longitudinal ones, have been too weak to provide any clinically relevant conclusion.[14,33] In the present study such occlusal interferences could be due to morphological characteristics of primary dental arches, as deviation of long axis of teeth, crossbite and open bite that could compromise the transverse width of the maxilla, leading to interferences during open and close movements. Besides occlusal interference, loss of posterior support, and lack of anterolateral guidance during mandibular movement could play an important role in initiating and perpetuating TMD.[24] Conversely, some studies refute these hypotheses, stating that there is no scientific evidence supporting such relationship.[17,2,44]

In our sample 5.05% of the children presented asymmetric condylar movement during mouth opening and closing, a value much smaller than the one observed in Bernal and Tsamtsouris[9] study reporting irregular movement of the condyles in 20% of the children, without locking, luxation or crepitations. Bodin *et al.*[10] reported that TMJ asynchronism (not simultaneous bilateral opening movement by palpation) was evident in 34 out of 52 patients in primary dentition, in 42 out of 52 patients after the eruption of first permanent molar, and in 31 out of 52 after the eruption of the permanent incisors. The asynchronism can be explained as a physiological subluxation of the condylar head from the relative flatness of undeveloped articular eminence, because in this age changes in contour in the TMJ are occurring.[9,26] This high difference in the prevalence of the asymmetric condylar movement between our study and other studies could be due to the different population and definition of the diagnostic criteria, as cited above.[4]

Among the symptoms, jaw pain was found in 4.04% of the children. A low prevalence of pain in the jaw was found in our study, similar to findings of the others in the same age[9] and in adolescents.[52,31] Moreover, Le Resche,[30] in a review article on the prevalence of the TMJ pain in children and adolescents, observed that reported jaw pain varied from 0.7% to 4%, depending on age.

Earache was verified in 3.03% of the children. This finding was similar to Bernal and Tsamtsouris[9] study that related the prevalence of frequent earache of 4% in preschool children attributed to a deep over bite or retruded anterior teeth, when the condyle is displaced distally and approximated to the petrotympanic fissure, relatively open in children. In this way, pressure is created through the fissure to the middle ear giving rise to symptoms such as fullness, earaches, roaring, tinitus and vertigo. Several anatomic relationships existing between the ear and the temporomandibular joint have been proposed to account for the presence of aural symptoms that occur in some patients with temporomandibular joint dysfunction.[6] Earache, tinnitus, dizziness and hearing loss are frequent complaints of patients with temporomandibular disorder. Certain patients, therefore, have to be examined by an otolaryngologist. All ear symptoms have to be meticulously described and evaluated by audiometry and vestibular examination. This is obligatory for the evaluation of treatment results and further exploration of the possible relation between these complaints and TMD.[23]

The frequency of difficulty in swallowing occurred in 3.03% of the children. Even showing a low prevalence, evaluation is very important, because swallowing is a physiological function of the masticatory system and dysfunction can cause severe problems in older ages. Goldstein *et al.*[21] verified in their study a correlation between facial pain and abnormal swallow patterns, which was a cause of hyperactivity of the digastrics.

These signs and symptoms cited above are frequently used to diagnose TMD,[25,11] however longitudinal studies have found that TMD signs and symptoms often fluctuate. Besides, the literature

shows wide differences in the more common components of TMD in different populations.[5] It will be interesting to explore whether these signs and symptoms can continue over a longer period of time and will provoke TMJ dysfunction.[9] Nevertheless, since TMD signs and symptoms are presented at the very young children, a routine dental examination of TMJ and masticatory system should be done to identify subjects at high risk of having TMD and to intervene at appropriate time.[5] Other factors must be also investigated in childhood, such as psychological and occlusal characteristics in order to associate them with dysfunction. It could be also important to consider if early interventions will prevent TMD or decrease the presence of signs and symptoms, since results from longitudinal studies suggest that not all individuals develop the disease.

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