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Prevalence and Types of Temporomandibular Disorders in Mexican Children Aged 7 to 11 Years

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ABSTRACT

Introduction: The prevalence of Temporomandibular Disorders (TMD) in children and adolescents, diagnosed according to the DC/TMD, ranges globally from 7.3% to 30.4%. **Objective:** To determine the prevalence and types of temporomandibular disorders using a validated and adapted instrument for the pediatric population in Mexican patients. **Material and Methods:** A descriptive observational study was conducted with 26 children aged between 7 and 11 years who attended the pediatric dentistry teaching clinic in Mexico. After obtaining informed consent and assent, participants were evaluated using the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) modified by Restrepo et al. in 2020. A standardized investigator (Kappa = 0.72) performed the evaluation. The obtained results were analyzed using descriptive statistics with SPSS. Additionally, a comparison was made with the literature reports. **Results:** A prevalence of TMDs of 27% was found, with a predominance in males (27.8%). Regarding the types of TMDs, 85.7% were muscular. Moreover, the presence of both types of joint sounds was reported, with 38.5% of clicks versus 3.8% of crepitus. **Conclusions:** The prevalence and types of TMDs are similar to those reported in previous literature. Those findings highlight the importance of early diagnosis using a validated instrument for TMDs by pediatric dentists. It is crucial to implement educational measures aimed at parents and pediatric patients to prevent future complications.

Keywords: temporomandibular disorders; temporomandibular joint; prevalence; temporomandibular pain; pediatric dentistry.

INTRODUCTION

The American Academy of Pediatric Dentistry (AAPD) defines Temporomandibular Disorders (TMD) as a series of muscular-skeletal and neuromuscular disorders that encompass a variety of clinical signs and symptoms. They affect the Temporomandibular Joint (TMJ), the masticatory muscles and their related structures. TMDs may present additional symptoms such as headache, neck pain and odontalgia[1-3].

The etiology of temporomandibular disorders is multifactorial and there is still insufficient evidence to predict with certainty which patients will develop these disorders. However, several contributing factors have been identified, such as initiating factors (trauma, parafunctional habits), predisposing factors (systemic, genetic, structural, psychological) and perpetuating factors (metabolic factors, stress, etc[4-6]).

Temporomandibular disorders (TMD) usually manifest in individuals between 20 and 40 years of age, with a prevalence that varies widely, from 4.2% to 88%[7]. Women are more predisposed to suffer from these disorders, and the prevalence of signs and symptoms tends to increase with age. For children and adolescents, the prevalence of TMD is diagnosed according to the Diagnostic Criteria for the Investigation of TMD (RDC/TMD) or the Diagnostic Criteria for TMD (DC/TMD) ranges from 7.3% to 30.4% in ages 10 to 19 years[8]. A common problem is reporting prevalences of TMD in children and adolescents who were evaluated with the adult

version of the DC/TMD. Restrepo *et al.*[9] in 2020 validated this instrument for children and adolescents. Under the Delphi process, the content of Axis I of the instrument was validated with confirmatory factor analysis to determine the construct validity. A one-factor model was contrasted with a second two-factor model and the third 7-factor model. The validation reported an internal consistency of 0.91 for model 2 and 0.94 for model 3. This allows reporting prevalences in this age group with greater validity and reliability.

Many children and adolescents with TMD do not seek medical attention, as these disorders are not frequently diagnosed in this age group because it is not considered a common condition in pediatrics. Despite this, it regularly affects this population, so it is important to include it in the examination of the stomatognathic system for preventive purposes. Early detection of TMD is key to minimizing its effects on the growth, development and quality of life of patients[2,7,10-14].

Therefore, it is crucial to highlight the problem of TMDs in children and adolescents, given the current scarce record of their prevalence with validated instruments in this age group. The aim of this study was to determine the prevalence and type of TMDs by means of a validated instrument adapted for the pediatric population in Mexican patients in order to detect them in a timely manner.

MATERIAL AND METHODS

After authorization by the ethics and research committee of the School of Stomatology of the Benemérita Universidad Autónoma de Puebla (BUAP), with registration 2021160, a descriptive, observational study was conducted in a sample of 26 children from 7 to 11 years of age, of both genders, who attended the Pediatrics Postgraduate Clinic of the Faculty of Stomatology, BUAP. For the selection of patients, a convenience sampling was performed. Only pediatric patients who were enrolled in basic education and those whose fathers, mothers or legal guardians gave their informed consent to participate in the study were included. This informed consent contained a detailed explanation of the procedures carried out during the evaluation. In addition, oral and written consent was obtained from the participating children with an appropriate explanation of the evaluation process. Patients who were excluded from the study were already under orthodontic, orthopedic, psychiatric or TMD treatment, or had experienced premature loss of teeth, or had any kind of disability, had chrome steel crowns and those who presented open bite.

The standardization performed by the investigator consisted of three evaluations performed on 10 children between the ages of 7-12 years; two by the investigator for intra-observer agreement with a kappa result of 0.9 and one more evaluation performed by the reference standard (IAEDS) to obtain the inter-observer kappa of 0.7.

For this study, the adaptation of the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) in children, developed by Restrepo *et al.*[9], was used. This instrument combines a background questionnaire with a clinical assessment. Restrepo *et al.*[9] made adjustments to the original questionnaire to adapt it to the pediatric population, including reducing the history period to 2 weeks, using a facial scale to assess pain intensity, and using language accessible to children. Parents and children completed the questionnaire together, and any information provided by the patient was verified by the parent or legal guardian.

The clinical assessment took about 20 minutes in a disinfected dental chair equipped with the appropriate biosafety barriers. The child was positioned at 90 degrees for examination, and during the examination, the investigator used appropriate protective measures to ensure biosafety.

Clinical examination included palpation of 16 muscle and 4 joint sites. A pressure of approximately 1 kg of force was exerted with the index fingers on the masseter and temporalis muscles, as well as on the articular area around the pole. A pressure of 0.5 kg was applied on the remaining muscles, as well as on the pole (articular site). After the application of the background questionnaire and clinical evaluation, the diagnostic tree of the instrument was applied to confirm the presence of painful TMDs; myalgia, myofascial pain, referred pain, arthralgia or headache associated with TMDs. The diagnosis of intra-articular disorders or degenerative joint disease was also confirmed, supported by magnetic resonance imaging if warranted. Patients who did not meet the diagnostic criteria sufficient to determine any type of TMD, according to the diagnostic tree of the instrument, were considered without TMD. The results obtained were analyzed using descriptive statistics; measures of central tendency and dispersion, frequencies and percentages. The analysis process was performed with the IBM® SPSS® v23 statistical package.

RESULTS

Table 1 shows the distribution of the sample with a higher frequency of boys; 18 boys *vs* 8 girls. The mean age by gender was higher in boys; 9.3 vs 7.8 years. No age differences were shown between patients with and without TMD in both genders. Of the 26 participating children, 26.9% were found to have a diagnosis of TMD. Regarding the diagnosis of TMD by gender, a slightly higher prevalence was identified in boys with respect to girls (27.7% vs 25%).

Table 1.
Distribution of the sample and diagnosis of TMD by gender

	Frequency	%	With TMD	%	Without TMD	%
Girls	8	100	2	25	6	75
Boys	18	100	5	27.7	13	72.3
Total	26	100	7	26.9	19	73.1
Age		Mean/SD	Mean	SD	Mean	SD
Girls	8	7.8/1.3	7.5	0.7	8	1.5
Boys	18	9.3/1.3	9.8	0.8	9.1	1.4

TMD: temporomandibular disorders, SD: standard deviation, %: percentage

According to the classification by type of TMD according to the diagnostic tree of the instrument used, a higher percentage was recorded for the muscular type (85.70%), followed by the articular type (14.30%). None of the participants presented combined TMD (Figure 1). The most frequently painful muscles were the masseter and temporalis and the most frequently painful articular site was the pole.

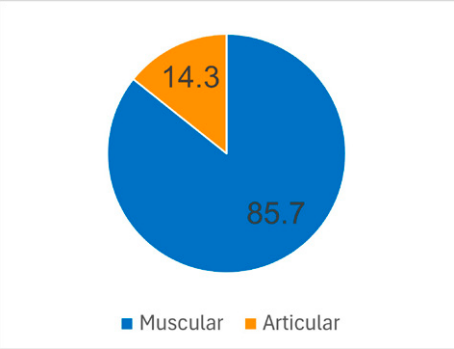


Figure 1. Types of temporomandibular disorders.

According to the opening pattern, the frequency of the corrected opening pattern was higher in girls (62.5%), followed by the straight pattern (37.5%). In contrast, in boys, the straight opening pattern (61.1%) was the most prevalent. Only one child in the entire sample showed an uncorrected left deviated pattern (5.6%) (Figure 2).

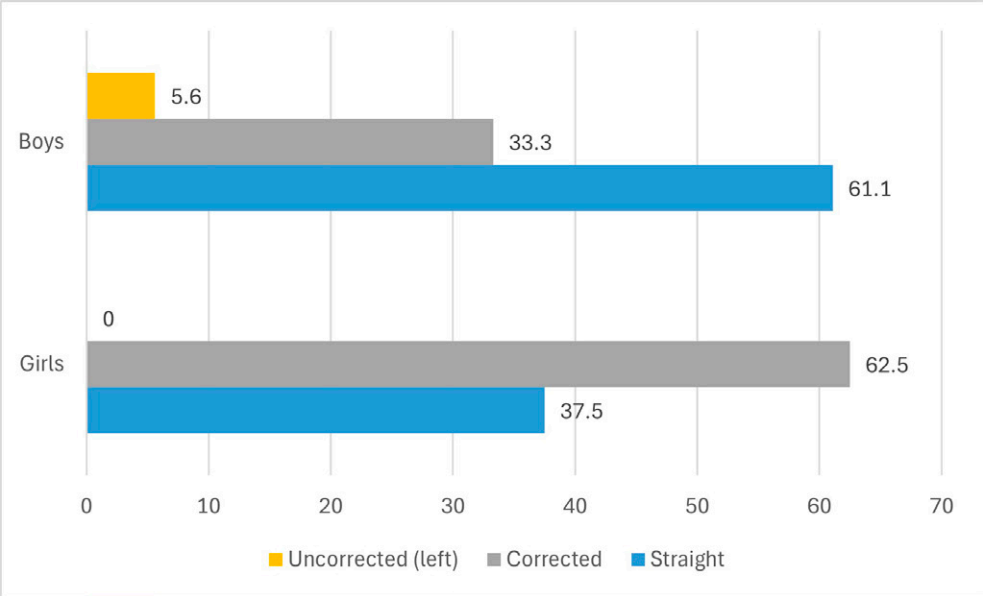
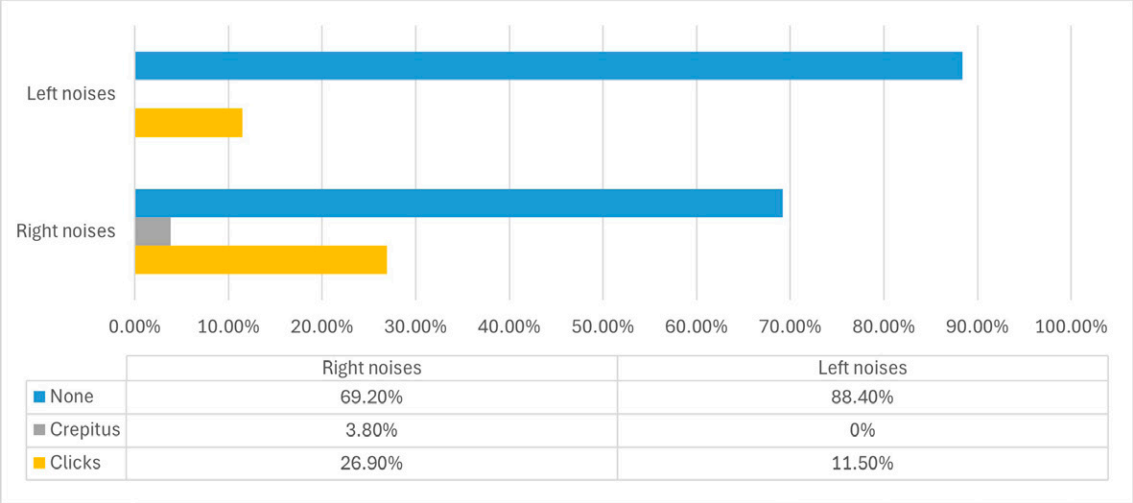


Figure 2. Opening pattern by gender.

Regarding joint noises, a relevant sign in the diagnosis of TMDs, clicks were present during opening and closing mandibular movements, as well as in lateral movements and protrusion performed by the patients, with predominance of the right side contrasted with the left (26.90% vs 11.50). Only one patient reported crepitus (3.80%) at the time of evaluation (Figure 3).

Finally, some patients presented only some symptoms of TMD without presenting the sufficient requirements according to the diagnostic tree of the instrument to be diagnosed with TMD. Eighty percent of the children had painful muscle sites, at least 1 of the 20 muscles evaluated. Regarding painful joint sites, 65.3% of the children reported pain in at least one of the four joint sites evaluated.



	Right noises	Left noises
None	69.20%	88.40%
Crepitus	3.80%	0%
Clicks	26.90%	11.50%

Figure 3. Joint noises

DISCUSSION

The prevalence of temporomandibular disorders in infants, children and adolescents varies widely in the world literature, due to the lack of a validated and adapted instrument for this population until 2020. The existence of reliable international standards and valid methods is crucial to obtain accurate and comparable results with previous reports, allowing a better understanding of this condition in the pediatric population.

In Mexico, information on temporomandibular disorders (TMD) in children is limited, especially with questionnaires adapted for this population. This study conducted in Mexican children aged 7 to 11 years revealed a 27.7% prevalence of TMD with a predominance of the muscular type (85.70%). Thirty-eight percent (38.5%) of the population presented joint noises; 26.9% on the right side and 11.5% on the left side. This result was compared with the study by Ramírez-Caro *et al.*[11] (2015), who reported a prevalence of 20.7% in children aged 8 to 12 years in the state of Puebla, with predominance of the muscular type (77.4%) and alterations in the mouth opening pattern (33.3%) and joint noises (34%). Their results are similar to those reported in the current investigation.

In contrast, the study conducted in Colombia by Arenas *et al.*[12] found a 35% prevalence of TMD in a sample of children aged 6 to 13 years, evaluated with the DC/TMD. Joint noises were identified as a relevant sign of TMD, with a frequency of 10% during mouth opening and 24% during mouth closing. This finding suggests that joint noises are an important indicator of TMDs in children.

The results of our study differ from the findings of Arenas *et al.*[12], because they found a higher prevalence of joint noises, with 39.9% of participants presenting this symptom in opening, closing, laterality and protrusion movements. This suggests that the prevalence of joint noises in the studied population is higher, in contrast to the ones reported in the present study.

Moyaho *et al.*[13] in 2010 conducted a study to assess the prevalence of signs and symptoms of temporomandibular disorders in children aged 8-12 years in the state of Puebla, Mexico using the Diagnostic Investigation Criteria for TMD. This instrument reported the signs and

symptoms of TMD without establishing the diagnosis. The signs and symptoms were present in 33.2% of the participants. A higher percentage was obtained for the muscular type with 48% and 19.1% presented joint noises during the evaluation.

On the other hand, Rauch *et al.*[15] in Germany, reported joint noises in one or both joints in their study with diagnosis by means of DC/TMD. These were detected in one third of the participants and were characterized as a clicking sound (30.6 %). Their results coincide with those of the present study.

Muscle pain during palpation in physical examination was another prevalent sign in more than half of the sample of the present investigation. The most painful muscles were the masseter and temporalis. These results are similar to those reported by Arenas *et al.*[12] who declared muscle pain and increased volume of the masseter and temporalis muscles as the most prevalent signs. It also coincides with what was found in the study by Rauch *et al.*[15] who reported that the temporalis muscle is the most affected in TMD.

CONCLUSIONS

The prevalence and types of temporomandibular disorders observed in the pediatric population in the dentistry teaching clinic of the Faculty of Stomatology of BUAP and evaluated with an instrument validated for the pediatric population are similar to what has been reported in previous literature.

These findings suggest a high risk of developing temporomandibular disorders (TMD) at early ages. This is due, in part, to the lack of routine examinations and *triage* or screening questionnaires during pediatric consultations, which allows for the timely detection of TMDs in their early stages. The absence of these assessments delays the identification of pediatric patients with TMD, which can worsen the condition.

Therefore, it is imperative to provide training on the topic, with the goal of integrating temporomandibular health care into preventive protocols for the pediatric population. The importance of early diagnosis of temporomandibular disorders by the pediatric dentist with a validated instrument is emphasized.

In addition, it is essential to implement educational measures aimed at parents and pediatric patients to prevent possible complications in the future.

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