Widespread Pain and Central Sensitization in Adolescents with Signs of Painful Temporomandibular Disorders

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Aims: To investigate the associations between signs of painful temporomandibular disorders (TMD) and number of tender points (TPs) and fibromyalgia in adolescents, as well as the relationship between TPs and pressure-pain threshold (PPT) in individuals presenting with local, regional, or widespread pain as a way to investigate the presence of central sensitization (CS). **Methods:** The sample consisted of 690 Brazilian adolescents with and without signs of painful TMD, aged 12 to 14 years old. Painful TMD was classified according to the Research Diagnostic Criteria for TMD (RDC/TMD) Axis I. The criteria established by Yunus were applied to assess juvenile fibromyalgia and TPs. Mann-Whitney and chi-square tests were applied to test the associations between signs of painful TMD and demographic variables. Regression models were used to estimate the association between signs of painful TMD and number of TPs and to determine which additional predictive variables were associated with TPs. Regression analyses were performed to test the associations between PPT values and number of TPs. Fisher test was used to estimate the association between signs of painful TMD and FM. **Results:** Significant associations between signs of painful TMD and the number of TPs ($P < .001$), as well as between TPs and the PPT values for local, regional, and widespread pain ($P < .001$), were found. No association between signs of painful TMD and fibromyalgia was found ($P = .158$). **Conclusion:** Individuals with signs of painful TMD presented with more TPs compared to pain-free adolescents. Moreover, the higher the number of TPs, the lower the PPT. This finding suggests that adolescents with signs of painful TMD are at increased risk of presenting with CS. *J Oral Facial Pain Headache 2020;34:83–91. doi: 10.11607/ofph.2288*

Keywords: *adolescent, central sensitization, fibromyalgia, pain, temporomandibular disorders*

The presence of pain in children and adolescents is associated with impairment of school performance, reduction in social activities, sedentary lifestyle, and greater risks for the development of other health problems and for psychosocial changes such as anxiety and depression.[1–4] The prevalence of chronic pain in the child/adolescent population is estimated to be between 25% and 37%, tends to increase with age, and is significantly higher in girls of 12 to 14 years of age.[5,6] In general, musculoskeletal pain is among the most prevalent type of pain, affecting approximately 40% of adolescents.[6,7]

Temporomandibular disorder (TMD) is a collective term embracing various musculoskeletal conditions affecting the masticatory system. TMD are characterized by the presence of pain in the temporomandibular joint (TMJ) and/or the masticatory muscles, joint sounds, and deviations or restrictions of jaw movement.[8] Their etiology is multifactorial and can include trauma, systemic diseases, genetic factors, and/or psychosocial factors.[9]

TMD patients often have concomitant painful comorbidities such as fibromyalgia (FM)[10] and persistent generalized pain of the body.[11–13] Moreover, the presence of pain elsewhere in the body, also called widespread pain, is an important predictor for the onset and maintenance of TMD pain.[14,15]

Three distinct patterns of pain distribution have been described: localized, regional, and widespread pain.[16] Widespread pain is associated with generalized alterations in pain processing and can indicate the presence of central sensitization (CS).[17–19] CS is an important aspect that is involved in the pathophysiology of various chronic musculoskeletal painful conditions, including TMD and FM.[20] Although CS cannot be directly measured, sensory experiences that are greater than expected in amplitude, duration, or spatial extent are reliable indicators of CS.[19] An increased excitation and reduced inhibition resulting in a pain response to innocuous stimuli (allodynia) or an exacerbated or prolonged response to noxious stimuli (hyperalgesia)[19,21] are part of the CS phenomenon.

The existence of tender points (TPs) is an important part of the FM diagnostic criteria. For adults, the current diagnostic criteria of the American College of Rheumatology (ACR) include the presence of widespread pain, somatic symptoms, and cognitive problems.[22] For the diagnosis of juvenile FM, a validated set of criteria proposed by Yunus and Masi requires a smaller number of TPs in children and adolescents than in adults: 5 instead of 11 out of the 18 TPs that can be assessed through digital palpation.[23]

TP count is a useful and effective clinical tool in epidemiologic studies for detecting elevated pressure pain sensitivity in painful musculoskeletal conditions.[24,25] TPs are indicators of widespread sensitivity[26] and possibly reflect an underlying dysfunction of the pain-processing pathways. They have also been described as indicative of the extent and spread of mechanical hyperalgesia.[27,28]

Similarly, the pressure pain threshold (PPT), which is defined as the minimum amount of pressure capable of inducing pain, is also frequently used in the evaluation of hyperalgesia.[29,30] Since hyperalgesia is considered to be one of the clinical markers of CS[21] and both PPT and the number of TPs can be used to evaluate hyperalgesia,[27–30] they can be considered useful tools for detecting the presence of CS. Furthermore, a negative correlation between these two measures is expected in patients with increased and generalized pain sensitivity. In other words, individuals with a higher number of TPs tend to have lower PPTs.[31]

The hypothesis of the present study is that adolescents with signs of painful TMD are at an increased risk of presenting with CS. For many chronic pain conditions, adults report the onset of their pain condition when they are young. Increasing such knowledge about the characteristics, associated factors, and comorbidities that are related to TMD and CS in adolescents is fundamental to achieve better control of this condition, minimizing the present and future damages that are commonly associated with chronic pain.

Thus, the present study aimed to investigate the existence of widespread TPs and a decrease in PPT as surrogates of CS in adolescents.[27–30] Moreover, the associations of signs of painful TMD with the number of TPs and the PPT values for local, regional, and widespread pain were investigated. An additional aim was to explore the association between signs of painful TMD and FM.

Materials and Methods

A population-based epidemiologic study was conducted in a sample composed of adolescents aged 12 to 14 years. The study sample consisted of students from public and private schools in the city of Araraquara, São Paulo, Brazil. After obtaining the consent of the city teaching board, the researchers approached the board of each school to obtain consent for the research. The researchers then visited random classes at each school, explaining the concept of TMD and the research objectives. The interested adolescents received an envelope that was given to their parents/legal guardians containing an explanatory letter about the research objective and the methodology used; consent forms; and questionnaires for collecting information about family economic classification and the general health of the adolescent.

Individuals eligible for inclusion were between 12 and 14 years of age and needed to present the consent form signed by themselves and their parents or legal guardians. Exclusion criteria were: adolescents who presented with cognitive problems or an impaired capacity for communication (determined by a prior medical diagnosis); use of daily pain medication (such as analgesics, anti-inflammatories, and/or corticosteroids or drugs that act on the central nervous system, such as antidepressants and stimulants); presence of odontogenic pain caused by extensive caries or a fractured tooth; presence of acute facial pain after a recent injury; adolescents undergoing orthodontic treatment; or adolescents undergoing TMD treatment (since therapeutic interventions aim to reduce peripheral and central sensitization and may alter their responses during the assessment).

A total of 713 adolescents were evaluated. Of these, 23 were excluded based on the following exclusion criteria: 5 due to the presence of extensive caries; 1 due to a fractured tooth; 6 because they were using orthodontic appliances; and 11 due to the use of medication (Ritalin, Venvanse, Vertigium, Gardenal, clomipramine hydrochloride, prednisone, Lorax, or topiramate). Figure 1 shows the flowchart of the participants who were included in the study.

The study was approved by the Research Ethics Committee of the School of Dentistry of Araraquara/UNESP (CAAE: 54755616.3.0000.5416).

Study Protocol: Evaluation Instruments and Methods

Economic Classification. Information regarding the family economic situation of each student was collected using a standardized questionnaire that included the Brazilian Economic Classification Criteria.[32] This questionnaire was answered by the parents or legal guardians of the adolescents and allowed for their classification into three groups: high class, middle class, or low class.

Pubertal Stage

The evaluation of pubertal stage was based on the five stages of development of pubic hair[33] and was adapted for self-evaluation through the use of drawings.[34] A researcher of the same gender individually assessed the adolescent by presenting drawings on a board. The adolescents were invited to identify the drawing that was most similar to their current stage of sexual maturation. Adolescents were divided into three groups according to their choices: prepubertal (stage 1 or 2), pubertal (stage 3 or 4), and post pubertal groups (stage 5).

TMD Pain Assessment

To exclude adolescents with other orofacial pain that could mimic TMD, an intraoral clinical examination was performed. Moreover, the criteria proposed by the AAOP[8] were applied to identify individuals presenting signs and symptoms suggestive of TMD. The presence of lesions in the soft tissues (tongue, floor of the mouth, palate, jugal mucosa, and lips); absence of dental elements; the presence of extensive caries; dental fracture; and the presence of orthodontic or orthopedic appliances were evaluated in the intraoral clinical examinations.

When a pain complaint was present, its features were evaluated, including its quality, time of installation, location, duration, periods of worsening and improvement, attenuating and aggravating factors, frequency, and intensity.

The confirmation and classification of the TMD diagnoses were obtained through application of the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) Axis I.[35,36] Additionally, questions 3, 4, and 14 of Axis II were applied, since they are necessary for the Axis I diagnosis. These Axis II questions include: "Have you experienced pain in the face, such as in the region of the cheeks (jaws), the sides of the head, the front of the ear or the ear, in the last 4 weeks?"; "How long has your face pain started?"; "Has your jaw ever been caught so that you
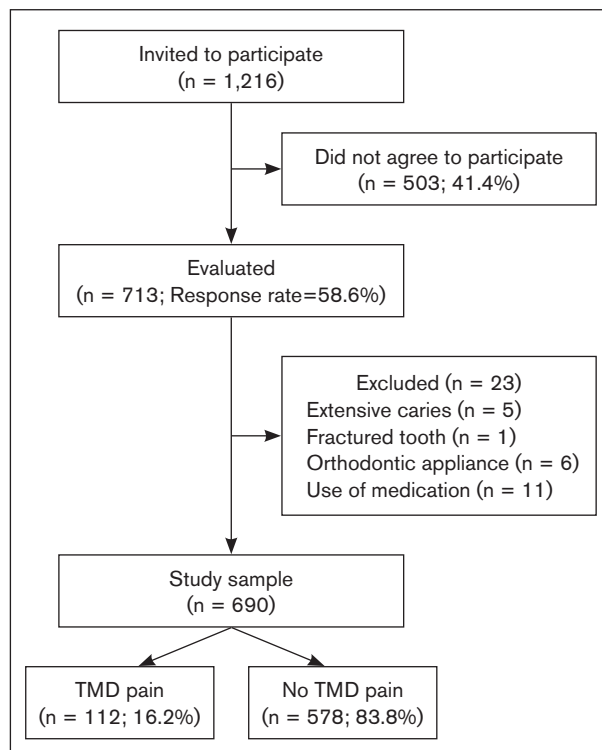
could not open your mouth completely?"; "Was this locking of the jaw (mouth) serious enough to interfere with your ability to chew?"[35,36]

The RDC/TMD were used to classify any TMD into group I (myofascial TMD), group II (TMJ disc displacement), or group III (arthralgia, osteoarthritis, or osteoarthrosis). Adolescents who were classified as presenting with group I and/or group IIIa or IIIb TMD were included in the signs of painful TMD group. The other adolescents were classified as having no painful TMD.[35,36]

Pain Intensity

The Revised Face Scale (FPS-R) for Brazilian students 7 to 17 years of age was used to measure pain intensity in the orofacial region in the last 3 months.[37] The FPS-R is a 6-sided scale that uses faces to explain variations between "no pain" and "a lot of pain." A numeric value of 0 to 10 is assigned to each face. Adolescents were instructed to choose the face that best reflected the intensity of their pain in the orofacial region that they felt during the evaluation, their usual pain, and the worst pain they had experienced in the past 3 months. The pain intensity was determined by the arithmetic mean of the three responses.[38]

Pressure Pain Threshold (Algometry)

Pressure pain thresholds (PPTs) were assessed bilaterally on the temporal muscles, masseter muscles,

Fig 1 Volunteer participation flowchart.

- Invited to participate (n = 1,216)
- Did not agree to participate (n = 503; 41.4%)
- Evaluated (n = 713; Response rate=58.6%)
- Excluded (n = 23); Extensive caries (n = 5); Fractured tooth (n = 1); Orthodontic appliance (n = 6); Use of medication (n = 11)
- Study sample (n = 690)
- TMD pain (n = 112; 16.2%)
- No TMD pain (n = 578; 83.8%)

lateral pole of the temporomandibular joints, trapezius muscles, and anterior tibial muscles.[29,39] An algometer was applied with a constant pressure of 0.5 kg/cm^2/second, with the metal tip of the device positioned perpendicular to the anatomical surface.[40] The researcher who was responsible for this examination underwent 15 hours of training to ensure an accurate assessment.

The PPT values of each structure were obtained bilaterally in three consecutive measurements that were separated by a 5-minute interval.[39] Adolescents were instructed to press the device's button at the first onset of pain perception.

For the analyses, the means of the three values on each side (right and left) of each structure were calculated.[29,41] Following this, the lowest mean for each side (right and left) of the temporal muscles, masseter muscles, and TMJs was used as a measurement of local pain. For the measurement of regional pain, the lowest mean of the two sides of the trapezius muscle was used. Finally, the lowest mean (right or left) of the tibial muscles was used as an indicator for widespread pain.

Tender Points

The examination of the TPs was based on the diagnostic criteria proposed by the American College of Rheumatology in 1990 (ACR).[22] Manual palpation was performed with the thumb at a steadily increasing pressure[42] up to 4 kg/cm^2 by a trained researcher. Eighteen points were palpated (nine on each side of the body): occipital, cervical, trapezius, supraspinal, second rib, lateral epicondyle, gluteal, major trochanter, and knee. A verbal report of pain from the application of pressure was recorded as a positive TP.[28]

The number of TPs was used as an outcome measure in the analyses of the TPs. Thus, the adolescent could present a total amount of TPs varying between 0 and 18.

Fibromyalgia

The criteria proposed by Yunus and Masi in 1985[23] were adopted for the identification of fibromyalgia in adolescents. These criteria consist of:

1. Report of generalized musculoskeletal pain in three or more body sites
2. Report of at least 3 months of pain (cited in the previous item)
3. Absence of underlying conditions that may explain the pain (cited in item 1)
4. Presence of pain in at least 5 out of 18 TPs (for a description, see the TP criteria above)
5. Presence of at least 3 of the following 10 characteristics: chronic anxiety or tension; fatigue; poor sleep; chronic headaches; irritable

bowel syndrome; soft tissue swelling; numbness or pain; modulation of pain by physical activity; modulation of pain by climatic factors; and modulation of pain by anxiety and/or stress.

Fibromyalgia (FM) was diagnosed if the individual presented with all four main criteria (items 1, 2, 3, and 4) and at least three minor criteria (item 5) or if the individual presented with the first three main criteria (items 1, 2, and 3), at least four sensitive points (item 4), and at least five minor criteria (item 5).[23] The presence of FM was evaluated by a properly trained researcher who performed the digital palpation with adequate pressure at the points that were determined by the diagnostic criteria.

Statistical Analyses

Demographic variables were stratified by the presence of signs of painful TMD. Mann-Whitney tests for independent samples and χ^2 tests were applied to determine whether differences in age, gender, pubertal stage, and economic classification were present between adolescents with signs of painful TMD compared to those without painful TMD.

To study the relationship between the presence of signs of painful TMD and the number of TPs and to determine which other predictive variables (pain intensity, age, gender, pubertal stage, and economic classification) were additionally associated with the number of TPs, a multiple linear regression model in a forward stepwise procedure was built. First, a single regression model with the number of TPs as the dependent variable and signs of painful TMD as the predictor was analyzed. In the case of a significant association, pain intensity was added to the model in a second step, since this measure is known to be associated with both the presence of TMD pain (the predictor) and TPs (the independent variable).[43] If pain intensity was additionally associated with the number of TPs, it was retained in the regression model. Then, the other possible predictive variables (ie, age, gender, pubertal stage, and economic classification) were added to the regression model one by one. The predictor that showed the strongest association with TPs was retained in the model. This process was repeated until no additional variables could be added to the regression model (P value for inclusion < .05).

To investigate the relationship between the number of TPs and the algometry outcomes, three single regression analyses were performed to test the associations between the PPTs for local pain, regional pain, and widespread pain (as predictors) and the number of TPs (as the dependent variable).

The explained variances of the various regression models were expressed by Nagelkerke R^2. Fisher

test was used to estimate the association between the presence of signs of painful TMD and FM.

Data analyses were performed using SPSS software, version 16.0 for Windows. The findings were considered significant when P was < .05.

Results

Descriptive Analysis

The sample was composed of 690 adolescents, including 389 girls (56.4%). The majority of individuals were in the pubertal development stage (64.2%), were middle class (48.7%), and were public school students (97.8%). The presence of signs of painful TMD was diagnosed in 112 (16.2%) adolescents. Among these, 40 (5.8%) presented with myalgia (group I), and 29 (4.2%) presented with arthralgia (group III). No adolescents presented with osteoarthritis.

Table 1 shows the sociodemographic characteristics of the participants with and without signs of painful TMD. No significant differences were found for the variables age, gender, pubertal stage, or economic classification between the adolescents with and without signs of painful TMD (P > .05).

Association Between Signs of Painful TMD and the Number of TPs

A multiple linear regression model (forward stepwise procedure) was built to study the relationship between the presence of signs of painful TMD and the number of TPs. In the first step of the multiple regression model, a significant association between the presence of signs of painful TMD and the number of TPs was found (Table 2; P < .001). Individuals with signs of painful TMD presented with a higher number of TPs (7.4 ± 4.1) compared to the individuals without painful TMD (4.3 ± 4.0 TPs). In the second step of the regression analysis, the variable pain intensity showed an additional association with the number of TPs and was added to the model (P < .001). Consequently, the explained variance (R^2) increased from 0.08 to 0.11 (P value of the change < .001). In the third step of the regression analysis, the other possible

predictive variables for the number of TPs were tested one by one (age, gender, pubertal stage, and economic classification). The only variable that showed a significant association with the number of TPs in this third step was gender (P = .001). When including this variable in the analysis, the explained variance (R^2) increased from 0.11 to 0.12 (P value of the change = .001).

Association Between PPT and the Number of TPs

Three single regression analyses were performed to test the respective associations between the PPTs for local pain, regional pain, and widespread pain and the number of TPs. The linear regression models showed a significant association between the number of TPs and the PPT values for all regions that were evaluated (Table 3). The explained variance (R^2) of the single regression models was 0.14 for local pain, 0.13 for regional pain, and 0.18 for widespread pain.

Table 1 Associations Between the Presence of Signs of Painful TMD and Socio-demographic Characteristics

Characteristics	Signs of painful TMD		χ^2	P value
	Absent (n = 578)	Present (n = 112)		
Age (y), mean ± SD	12.7 ± 0.76	12.8 ± 0.8	a	.415
Gender				
Male	261 (86.7)	40 (13.3)		
Female	317 (81.5)	72 (18.5)	3.401	.082
Pubertal stage				
Prepubertal	126 (82.9)	26 (17.1)		
Pubertal	376 (84.9)	67 (15.1)	1.477	
Postpubertal	76 (80.0)	19 (20.0)		.478
Economic classification				
High	248 (82.4)	53 (17.6)		
Middle	285 (84.8)	51 (15.2)	0.720	
Low	44 (84.6)	8 (15.4)		.698

SD = standard deviation. Data are reported as n (%) unless otherwise indicated.
[a]Mann-Whitney test for independent samples.

Table 2 Linear Regression Model for the Association Between the Number of TPs and the Presence of Signs of Painful TMD

	No. of TPs			
	b	SE	β	P value
Step 1				
Constant	4.29	0.17		< .001
Signs of painful TMD	3.13	0.41	0.28	< .001
Step 2				
Constant	3.17	0.29		< .001
Signs of painful TMD	2.66	0.42	0.24	< .001
Pain intensity	0.29	0.06	0.18	< .001
Step 3				
Constant	2.75	0.31		
Signs of painful TMD	2.63	0.42	0.23	< .001
Pain intensity	0.25	0.06	0.15	< .001
Gender	1.05	0.31	0.13	.001

TPs = tender points; TMD = temporomandibular disorders; b = unstandardized regression coefficient; SE = standard error; β = standardized regression coefficient.

Table 3 Regression Models for the Associations Between the Number of Tender Points (TPs) and PPT Values for Local, Regional, and Widespread Pain

	No. of TPs			
	b	SE	β	*P* value
Local pain				
Constant	7.80	0.32		.000
PPT	−1.86	0.18	−0.37	.000
Regional pain				
Constant	7.20	0.28		.000
PPT	−1.04	0.10	−0.36	.000
Widespread pain				
Constant	8.00	0.29		.000
PPT	−0.86	0.07	−0.43	.000

PPT = pressure pain threshold; TMD = temporomandibular disorders;
b = unstandardized regression coefficient; SE = standard error;
β = standardized regression coefficient.

Table 4 Association Between the Presence of Signs of Painful TMD and Fibromyalgia (FM)

	Signs of painful TMD, n (%)		PR (95% CI)	Fisher (*P*)
FM	Absent	Present		
Absent	567 (84.1)	107 (15.9)	Ref	
Present	11 (68.8)	5 (31.2)	1.22 (0.88–1.71)	.158

PR = prevalence ratio; CI = confidence interval.

Association Between Signs of Painful TMD and FM

The presence of FM was diagnosed in 16 individuals (2.3%). Among them, 5 adolescents (31.2%) also presented with signs of painful TMD. In the performed analyses, no significant association between signs of painful TMD and FM was found (Table 4).

Discussion

This study investigated the association between the number of TPs and signs of painful TMD in adolescents and the relationship between the number of TPs and PPT values for local, regional, and widespread pain. The association between signs of painful TMD and FM was also explored. A higher number of TPs was associated with the presence of TMD pain as well as lower PPTs for local pain, regional pain, and widespread pain regions. An association between signs of painful TMD and FM was not found.

The prevalence of TMD among children and adolescents has been investigated in previous epidemiologic studies, which have indicated rates of TMD ranging from 2% to 25%.[44–47] In the present sample, 16.2% of the adolescents who were evaluated had signs of painful TMD. Regarding gender, the literature points to a higher prevalence of painful TMD among girls than among boys.[48] Although a trend toward a higher number of girls than boys with signs of painful TMD was found in this study, no significant difference was present.

Pain outside the TMJs and masticatory muscles, including sites other than the head and neck regions—called widespread pain—is prevalent among TMD patients.[11–13] Previous studies have suggested that general hyperexcitability in central nociceptive processing is part of the pathophysiology of TMDs, and this could explain the greater sensitivity to pain in multiple body areas in TMD patients.[11,16,49–51]

TPs are not simply a measure of current pain, but can also be suggestive of an altered central modulation of pain.[26] This state of altered pain modulation can be observed early in children and adolescents,[52] resulting in higher sensitivity to pain in adulthood,[53] and this effect is also reflected in the stomatognathic system.[54]

In this study, adolescents with signs of painful TMD presented with more TPs throughout the body compared to those who did not have painful TMD. In addition to the presence of TMD pain, a higher intensity of pain and the female gender were predictive for the number of TPs in adolescents. These results indicate that adolescents with signs of TMD pain may present with a more generalized sensitivity, a dysfunction of the central nociceptive system, and an increased risk of CS. These findings corroborate previous studies reporting that a greater sensitivity to pain is associated with painful TMD, not only in the affected area but also in remote bodily sites.[11–13,55] Furthermore, this increased sensitivity is mainly found among girls.[48,56,57]

One of the main characteristics of CS in patients with musculoskeletal pain is the generalized reduction in PPT,[58] and this effect is frequently used in the evaluation of hyperalgesia.[29,30] Chronic pain rarely manifests in a single body site. In this study, three distinct patterns of pain distribution were investigated: localized, regional, and widespread pain.[16] A significant association was found between the number of TPs and the PPT values for all the regions evaluated. Adolescents with a higher number of TPs presented with lower PPT values in the algometry test for local pain, regional pain, and widespread pain regions. This association was expected since changes in the functional properties of the neurons that occur during the CS processes are sufficient to reduce the pain threshold and to increase the magnitude and duration of responses to noxious inputs, not only in the face but also throughout the body.[59] The PPT results reinforce the findings regarding the increased and generalized sensitivity in these adolescents, since

both PPT and TPs are instruments that are used to evaluate pain sensitivity.[24–30]

Although the presence of signs of painful TMD was significantly associated with the number of TPs, no significant association between signs of painful TMD and FM was found. In this study, 2.3% of the adolescents were diagnosed with FM, corroborating the scarce data in the international literature that estimates the prevalence of FM among children and adolescents to be between 2% and 6%.[23]

This study has some limitations that should be mentioned. First, as TP palpation was performed in 18 points, the method is open to a bias called the halo effect. This bias is related to the theory that subjects want to be consistent in their response to feel as if they are doing the task correctly. Thus, they may judge the painfulness of the very first TP evaluation and then model all of their subsequent responses accordingly.[24] Although this pattern has not been found in the present data, it must be mentioned that this limitation may exist. Second, there is a limited representativeness of the sample regarding the social status of the subjects, since the majority of adolescents who were evaluated were public school students. The percentage of students in public schools in Brazil is 78.5%. In the present sample, 97.8% of the adolescents were public school students. Therefore, the results cannot be extrapolated to the general population of adolescents. Although the sample is not representative of this topic, the association between TP and TMD is not expected to differ in adolescents from private schools. The third limitation refers to the fact that adolescents were free to agree or to decline to participate in the study. Thus, the percentage of adolescents with signs of painful TMD and FM that was found in the study may not correspond to the prevalence of signs of painful TMD and FM in the schools that were evaluated, although the prevalence of both conditions was found to corroborate the data from the international literature.[23,44–47]

Last, according to the literature, children with growing pain (GP) have more TPs and lower PPTs than children without GP.[60] Therefore, the pain that was manifested by adolescents in this study may also refer to GP. All of the recommended protocols for assessing TMD, FM, and TPs in adolescents were followed to avoid information biases. While it may be a possible limitation of this study, the prevalence of FM in this study is similar to the reported rates in previous studies among adolescents of the same age.[23]

In addition to adults, chronic widespread pain also occurs in adolescents.[23,61] However, to the best of the present authors' knowledge, this is the first study to report the relationship between the number of TPs and the presence of signs of painful TMD and the association between TPs and PPT in adolescents. These data suggest that adolescents with signs of TMD pain are at an increased risk of suffering from CS. These results indicate that adolescents with signs of painful TMD show more generalized sensitivity and might therefore be more vulnerable to centralized painful conditions, such as FM. Moreover, chronic widespread pain is noted to be an early indicator of FM.[62]

The association that was found between the number of TPs and TMD pain may indicate that adolescents in this age group may be in an early stage of illness progression. While more time is needed before such pathophysiologic changes can be expressed in the clinical features of FM, the present findings may indicate an increased risk for developing such complaints at an older age. Therefore, health care providers should be attentive to young patients, and dentists and physiotherapists could collaborate for an early diagnosis of these conditions.

Conclusions

FM and widespread pain constitute factors that can increase the burden of TMD and their refractoriness to management, pointing to their importance at being considered in the evaluation of TMD.[11] Assessing these signs early in adolescents could help prevent the development of these disorders and of CS in adulthood, thus contributing to better control of painful conditions, avoiding their chronification and increasing the patient's quality of life.

Acknowledgments

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