

Pain catastrophizing in temporomandibular disorders patients

Catastrofização da dor em pacientes com disfunção temporomandibular

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Resumo

A Disfunção Temporomandibular (DTM) é um termo coletivo para uma síndrome musculoesquelética dolorosa, articulação temporomandibular e estruturas associadas. Objetivo: Avaliar o nível de catastrofização da dor em indivíduos com DTM. Métodos: um total de 40 participantes foram avaliados e divididos em dois grupos: um grupo controle com 20 indivíduos sem DTM e um grupo experimental com 20 indivíduos com DTM. Os participantes com DTM foram avaliados por meio de anamnese e exame clínico considerando sua queixa principal e seguiram os Critérios de Pesquisa Diagnóstica para Disfunção Temporomandibular. A Escala de Catastrofização da Dor foi aplicada a todos os participantes de ambos os grupos. Resultados: Embora as mulheres representassem o maior grupo com DTM, elas não apresentaram maiores níveis de catastrofização da dor em comparação aos homens. A idade não foi estatisticamente relevante, o que contradiz alguns estudos publicados anteriormente. O grupo com DTM apresentou maior índice de catastrofização da dor ($p \leq 0,001$), mas nenhum subtipo de DTM se relacionou com esse índice. Ruminação, magnificação e desesperança foram relevantes neste estudo e apresentaram alta correlação com DTM. Conclusões: pacientes com DTM apresentaram maiores escores de catastrofização da dor do que indivíduos saudáveis.

Palavras-chave: catastrofização; prevalência; dor crônica; Síndrome da Disfunção da Articulação Temporomandibular.

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Introdução

According to the International Association for the Study of Pain (IASP), pain is an unpleasant sensory and emotional experience associated or similar to that associated with actual or potential tissue injury. Among the various pain-causing factors within dentistry, temporomandibular disorders (TMD) represent a large group of disorders that can generate this symptom.^{1, 2}

TMD comprises many disorders that affect the temporomandibular joints, the masticatory muscles, and their associated structures. It affects about 15% of the adult population and is more prevalent between the ages of 20 and 40. It has a multifactorial etiology, which involves a biopsychosocial model, and, therefore, is related to biological, social/behavioral, and psychological factors. The diagnosis is made through the patient's past medical history and clinical signs, following the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) specific criteria.³ The main symptoms of this disorder are: clicking when one opens or closes the mouth, intense muscle pain when masticating, and difficulty moving the mouth.⁴

Most patients improve with a combination of non-invasive therapies, including education, self-care, cognitive-behavioral therapy, pharmacotherapy, physical therapy, and interocclusal devices. Non-steroidal anti-inflammatory drugs and muscle relaxants are initially recommended, and benzodiazepines or antidepressants can be added for chronic cases according to the TMD subtype initially diagnosed.⁵

Literature points out that patients with prolonged and intense TMD symptoms may have psychological, behavioral, and psychosocial issues.⁶ In some cases, catastrophizing is one of these conditions that can be associated with previous ineffective treatments of patients with TMD.⁷ Catastrophizing refers to a series of exaggerated, ruminative, and negative emotions and thoughts during actual or potential painful stimulation.⁸

Questionnaires are applied in clinical routines as well as in research to assess self-reported symptoms, such as subjective pain and psychometric status⁹, due to the psychosocial factors that may be related to both the impairment of functional capacity and duration of pain. Thus, catastrophizing can intensify the symptoms generated by TMD, as it is closely related to chronic pain episodes. Furthermore, catastrophizing limits the improvement of symptoms through conventional therapies, hindering a possible clinical discharge of patients with TMD.⁷

This study aimed to: (a) evaluate catastrophizing levels in individuals with TMD; (b) investigate whether individuals with TMD have higher catastrophizing levels than healthy individuals; (c) investigate whether different TMD diagnoses determine a higher or lower catastrophizing level; and (d) investigate whether a higher intensity and duration of pain determine a higher catastrophizing level.

Materiais e método

This is a cross-sectional observational study. Forty individuals participated in this study within a period of approximately 6 months. These individuals were patients at the outpatient service for TMD and Orofacial Pain at the Federal University of Paraná (SAMDOF), and healthy individuals who voluntarily agreed to participate upon learning about the research through publicity. The participants read and signed the corresponding informed consent form (ICF). Approval was granted by the Ethics and Research Committee of the Health Sector at the Federal University of Paraná. Reference number: 3.619.450.

Two groups were formed: an experimental group and a control group, following specific criteria:

(1) TMD group: 20 individuals with TMD classified according to the RDC/TMD criteria;

(2) Control group: 20 healthy individuals with no complaints, signs and/or symptoms of TMD, who were evaluated according to the screening questionnaire recommended by the American Academy of Orofacial Pain.

The exclusion criteria for both groups were individuals under the age of 18 and/or illiterate, and individuals who did not agree to the ICF.

All participants in the TMD group were evaluated through anamnesis and clinical examination considering their chief complaint, and following the RDC/TMD. The examination was performed at the Outpatient Clinic 1 of the Restorative Dentistry Department of the Federal University of Paraná following all the applicable biosafety protocols; the examiner was properly dressed in personal protective equipment and executed the decontamination of dental equipment (chair and assistant table) between each patient according to the biosafety protocols.

Sterilized clinical instruments — clinical mirror, forceps, and exploratory probe — were used to maintain the patient's lips open and visualize their oral cavity. The examination was totally non-invasive and consisted of an oral inspection for changes in the oral cavity and a bilateral digital palpation of masticatory muscles of the temporomandibular joint, as recommended by the RDC/TMD.

The Brazilian Portuguese version of the Pain Catastrophizing Scale (PCS) was applied on all participants from both groups in a pre-treatment consultation. PCS is a self-report measure that consists of 13 questions rated on a Likert scale ranging from 0 to 4 points, associated with the words “never” and “always” at each end. It is also divided in three subscales: hopelessness (items 8, 9, 10, 11), with the score ranging from 0 to 16; magnification (items 6, 7, 13), with the score ranging from 0 to 12; and rumination (items 1, 2, 3, 4, 5, 12), with the score ranging from 0 to 24. The total score is the sum of the

answers for each item and can range from 0 to 52. Higher scores indicate a higher catastrophizing level.

All data were tabulated and evaluated using R statistical software (version 3.6.3, R Core Team, 2020) and SPSS software. The Mann-Whitney test was used to compare the means of age, intensity and duration of pain, as well as catastrophizing scores between the studied groups; this test was also used to verify the association between PCS domains with each TMD diagnosis. Fisher's exact test was used to evaluate the frequency difference between male and female participants in each group. Spearman's correlation test was used to analyse the variables (age, duration of pain, and pain scale according to the PCS), and the catastrophizing level. A 5% significance level was considered for all tests.

Resultados

A total of 76 individuals were initially evaluated and, after applying the inclusion and exclusion criteria, the number of participants was narrowed down to 40; 20 individuals formed the control group and the other 20 formed the TMD group.

The mean age of the TMD group was 43.10 years, with a median of 44.0 (28.5–60.3) years; in the control group, the mean age was 34.15 years, with a median of 36.0 (25.8–41.3) years. Figure 1 shows the statistically non-significant age difference ($p = 0.107$) between the TMD group and the control group.

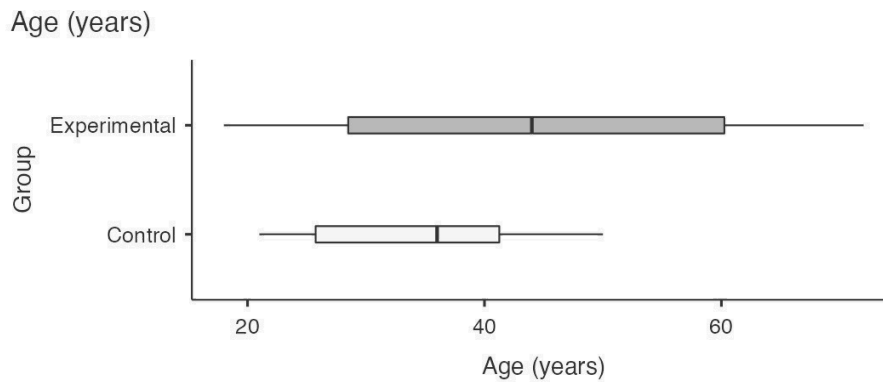


Figure 1. Ages of each group

Figure 2 shows the overall Pain Catastrophizing Scale (PCS) scores for each group. The median value for the TMD Group was 34 (17–41) and for the Control Group, 12.5 (4.75–19.8). There was a statistically significant difference, with a higher catastrophizing score for the TMD Group ($p \leq 0.001^*$).

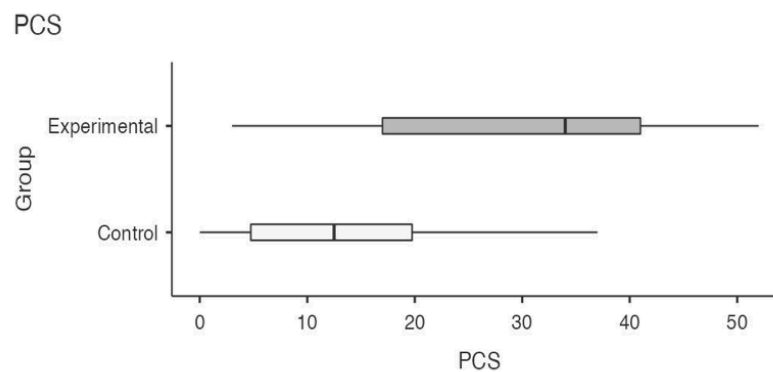


Figure 2. Overall Pain Catastrophizing Scale (PCS) scores for each group.

Table 1 shows the distribution of participants by sex, with more female individuals in the TMD group. This difference was statistically significant ($p = 0.04$).

Table 1. Distribution of individuals by sex in each group.

	Female	Male	Total
TMD Group	19	1	20
Control Group	13	7	20
Total	32	8	40

Table 2 shows the median values for each domain of the PCS. A statistically significant difference was observed between the groups for all domains. Patients in the TMD Group had higher catastrophizing scores in all domains.

Table 2. Scores by domains of the Pain Catastrophizing Scale (PCS) for each group.

Domain	TMD Group	Control Group	p
Hopelessness	11.50 (7.75–13.0)	4.50 (1.75–6.5)	0.0016*
Rumination	14 (6.0–20.0)	5.5 (0.75–7.0)	0.0013*
Magnification	7 (5.50–9.25)	3 (1.0–6.0)	< 0.001*

* statistically significant.

Table 3 shows the correlation values between age, duration of pain, and intensity of pain of participants in the TMD Group. We can see that there was a positive and statistically significant correlation between the mentioned variables and the overall mean total score of the Pain Catastrophizing Scale (PCS).

Table 3. Correlation between variables and the mean total score of the Pain Catastrophizing Scale (PCS).

	PCS	
Age	p=0.0036*	r=0.44
Duration of pain	p=0.0015*	r=0.48
Intensity od pain	p=0.001*	r=0.66

*statistically significant

There was no statistically significant difference in the PCS between male and female participants ($p = 0.22$), nor was there an association between a higher catastrophizing index (PCS) with some specific TMD subtype ($p \geq 0.05$) diagnosed through the RDC/TMD.

The cases with the highest rates of catastrophizing by domains (rumination, magnification, and hopelessness) corresponded to higher rates of pain intensity, considering a longer period of living with pain and the older ages among the patients, as shown in table 4. The sex of the participants was not relevant in this comparison ($p > 0.05$) for any of the domains.

Table 4. Correlation between the variables age, intensity of pain, and duration of pain, with the different domains of PCS for the TMD group

TMD Group	Age	Intensity of pain	Duration of pain
Rumination	$p=0,0045$ $r=0,43$	$p<0,001^*$ $r= 0,63$	$p=0,0028$ $r=0,46$
Magnification	$p=0,0025$ $r=0,46$	$p<0,001^*$ $r=0,61$	$p=0,0016$ $r=0,48$
Hopelessness	$p=0,03$ $r=0,33$	$p<0,001^*$ $r=0,62$	$p=0,0052^*$ $r=0,43$

*statistically significant

Discussão

With the current scientific advances in the study of pain, the associations between psychosocial factors and chronic pain became more evident. This study aimed to analyse the association of psychological factors, such as pain catastrophizing and its domains — rumination, magnification, and hopelessness — with TMD. Additional factors, such as participants' ages, sex, and intensity and duration of pain, were also analysed.

Given the evaluated data, the distribution of frequency between sexes in the TMD group was higher among female participants (80%) than male participants (20%), and the median age was 37.6 years. This was already expected since TMD more often affects

female than male individuals between 25 and 40 years of age.¹ According to Ferreira et al.¹⁰ recent evidence indicates substantial differences in clinical and experimental pain responses according to the patient's sex. Female individuals have a higher prevalence of pain state than male individuals, including TMD symptoms and orofacial pain, with ratios ranging from 2 to 6 females to every male. Similarly, Senna et al.¹¹ concluded that chronic pain is more prevalent in young adults (mean age 37 + or - 27 years), female, unemployed, and people with low socioeconomic status (D class). In the present study, the age difference between the TMD group and the control group was not statistically relevant, which demonstrates a good quality of sample selection, with a certain homogeneity among the participants.

Filligim et al.⁶ associated psychosocial factors with chronic pain and TMD. In this study, both patients with chronic TMD and healthy patients were selected. Participants answered questionnaires assessing general psychosocial and personality aspects, affective distress, psychosocial stress, somatic awareness, pain coping, and catastrophizing. Through PCS, it was observed that TMD cases had higher levels of catastrophizing than the control group for all three domains — rumination, magnification, and hopelessness. Reiter et al.¹² found that depression and catastrophizing contributed to the progression of TMD chronification, demonstrating the importance of early diagnosis of catastrophizing to prevent the evolution of acute pain to chronic pain. These studies are in agreement with ours, with a relevant statistical difference ($p \leq 0.001$) in which the TMD group had the highest catastrophizing scores. There was no association between a higher PCS score with any subtype of TMD (for all $p \geq 0.05$). The PCS domains — rumination (recurrent negative thoughts with a tendency toward depressive and anxious pictures), magnification (amplification and exaggeration of pain), and hopelessness (feeling unable to control pain symptoms) — were also assessed in this research.¹³ As expected and already observed in other studies, the TMD group showed higher values in

all three domains, with $p\text{-value} = 0.0016$ for hopelessness, $p\text{-value} = 0.0013$ for rumination, and $p\text{-value} < 0.001$ for magnification. Accordingly, Willassen et al., 2020 found evidence that catastrophizing is an important predictor of TMD. Furthermore, the authors state that psychosocial evaluation in TMD patients should always be performed to help in their treatment plan.¹⁴

Other study also demonstrated a higher total PCS score for patients with TMD than those without TMD.¹⁵ Regarding the domains of the scale, the difference was statistically significant for magnification ($p < 0.001$) and hopelessness ($p < 0.001$), whereas there was no difference for rumination ($p = 0.005$). This may be due to the small study sample size and the control group having less participants than the TMD group.

There is still controversy regarding age, however, studies suggest that young individuals are more catastrophic¹⁶ when examined key demographic and psychosocial variables and their association to those related to pain. Catastrophizing and depression were chosen as potential factors based on previous research, demonstrating the importance of these psychosocial aspects. The findings showed that pain catastrophizing is influenced by age, affecting intensity of pain, as pointed out by McCracken¹⁷, who states that as age increases, chronic pain becomes an expected and more accepted experience. Thus, older patients tend to catastrophize less than younger patients, which shows that age is important and potentially significant for pain interference relationships. These studies evaluated chronic pain in general and not that related to TMD specifically, which perhaps explains the difference between the results of the present study: the higher the age, the greater the pain catastrophizing ($p = 0.0036^*$).

Velly et al.⁷ evaluated the effect of catastrophizing and depression on pain progression and functional capacity impairment among TMD patients. Two steps were performed: first, the authors evaluated the effect of catastrophizing and depression on the progression of pain intensity and disability scores over 18 months. Then, they assessed

the effect of catastrophizing and depression on both the onset of pain and its clinical progression. The results showed that catastrophizing at the beginning of this study contributed to an increase in intensity of pain and functional capacity impairment over the 18-month period in all TMD individuals. This literature is in agreement with the positive correlation result between PCS scores and intensity of pain ($p \leq 0.001^*$).

Regarding the duration of pain, our study shows significant correlation with PCS ($p = 0.0015^*$). According to Kreling et al.¹⁸, chronic pain makes the individual more vulnerable to the occurrence of negative thoughts. In agreement, Jones et al.¹⁹, cite that the catastrophizing in individuals with chronic pain reflects this lack of control over a painful condition and the constant presence of negative thoughts. Furthermore, in another study evaluating TMD patients, those who had high catastrophizing levels were more likely to present persistent pain, which contributed to its chronification.²⁰

According to Shaefer et al.²⁰, the “sex” variable is one of the most influential factors in pain catastrophizing. In addition to behavioral factors, female individuals have hormonal variations throughout their lives that can affect pain perception and coping when compared to male. In contrast, the present study shows no statistically significant difference correlating sex and PCS ($p = 0.22$).

A systematic review revealed that catastrophizing in TMD patients can affect not only the severity of symptoms but also treatment outcomes. Thus, the study showed that assessing pain catastrophizing levels may be important in the evaluation and management of TMD patients.²¹

Despite the results found in this study, the small sample size is a limitation, which reinforces the caution in interpreting the data and the suggestion of other research for comparison purposes. In addition, the participants of the TMD group patients were part of

a convenience sample, within a care center for people with TMD and Orofacial Pain complaints, which may have contributed to an exacerbation of the results.

Pain catastrophizing is found more often in patients with some type of TMD, with no specific subtype. It is believed that psychosocial factors, such as catastrophizing, may influence the pain experience in these individuals due to the multifactorial etiology associated with TMD. Therefore, a multidisciplinary approach is needed, including psychotherapies associated with dental approaches for pain control in TMD patients.

Conclusão

Based on the results of this study, it can be concluded that individuals with TMD have higher scores on the overall PCS and its specific domains against a control group. However, there was no correlation of any specific TMD subtype with higher catastrophizing scores. Patients with TMD seem to have higher scores of catastrophizing as their age, and intensity and duration of pain increase.

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Abstract

Background: Pain catastrophizing can be defined as a series of negative thoughts about an actual or potential painful experience. Temporomandibular dysfunction (TMD) is a collective term for a painful musculoskeletal syndrome, temporomandibular joint and the associated structures. **Aim:** Evaluate the level of pain catastrophizing in individuals with TMD. **Methods:** a total of 40 participants were evaluated and divided into two groups: a control group with 20 individuals without TMD and an

experimental group with 20 individuals with TMD. Participants with TMD were evaluated through medical history and clinical examination considering their chief complaint and followed the Research Diagnostic Criteria for Temporomandibular Disorders. The Pain Catastrophizing Scale was applied to all participants in both groups. **Results:** Although women represented the largest group with TMD, they did not present higher levels of pain catastrophizing compared to men. Age was not statistically relevant, which contradicts some previously published studies. The group with TMD had a higher pain catastrophizing index ($p \leq 0.001$), but no TMD subtype was related to this index. Rumination, magnification, and hopelessness were relevant in this study and showed high correlation with TMD. **Conclusions:** patients with TMD presented higher scores of pain catastrophizing than healthy individuals.

Keywords: catastrophizing; prevalence; chronic pain; Temporomandibular Joint Dysfunction Syndrome.

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