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Correlation between anxiety and depression in patients with temporomandibular disorder

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• Conflicts of interest: none declared.

Abstract

Objective: to evaluate the correlation between anxiety and depression in the presence of Temporomandibular Dysfunction. **Material and Methods:** sixty patients attended at the TMJ Service of the Dental School of the Federal University of Juiz de Fora, located in the city of Juiz de Fora/Minas Gerais, Brazil, participated in the study. Of these sixty, thirty had diagnoses of temporomandibular disorder from the Research Diagnostic Criteria for Temporomandibular Disorder, and thirty did not have a diagnosis of dysfunction. All participants answered the Hospital Anxiety and Depression Scale questionnaires and the Beck Anxiety Inventory. The data obtained were analyzed using the Statistical Package for the Social Science 14.0 program with the Chi-square test and a significance level of 5% (p<0.05). **Results:** there was a significant correlation between the parameters gender (p=0.024), mean age (p=0.033), presence of temporomandibular disorder (p=0.034) and the anxiety variable. As for the variable depression, there was a significant correlation for the diagnosis of temporomandibular disorder (p=0.029), and a non-significant correlation for gender (p=0.608) and mean age (p=0.175). **Conclusion:** there is a relationship between psychological and psychosocial factors, such as anxiety and depression with temporomandibular disorders.

Keywords: Temporomandibular disorder; Anxiety; Occlusion.

Introduction

Temporomandibular disorder (TMD) is a condition that affects the masticatory muscles, the temporomandibular joint (TMJ) and associated structures.[1] The prevalence of the dysfunction varies according to each population, but it is more likely to occur in female patients,[2,3] between the third and fifth decades of life.[4]

TMD encompasses several types of signs and symptoms that can be muscular and/or articular, the main ones being characterized by pain and/or dysfunction of the stomatognathic system, among them are: TMJ pain, crackles and joint noises, difficulty in mouth opening, headache, vertigo, otalgia, depression, reduced mandibular range of motion, muscle pain and tenderness, functional limitation or deviation of jaw opening.[5-8]

Its etiology can be associated with trauma, parafunctional habits and psychosocial factors such as stress, anxiety and depression. The literature indicates that myofascial pain may be due to psychosocial factors and that the manifestations of myofascial pain and discomfort coincide with moments of tension and stress, causing parafunctional problems.[1,9] Even though some studies point to the existence of the anxiety/depression with TMD, there are still contradictions regarding this correlation.[10,11]

In this study, the RDC (Research Diagnostic Criteria for Temporomandibular Disorder) was used, which is considered the gold standard for the diagnosis of TMDs.[6,9,12-18] Based on this and the result of the present study, it will be possible to establish more effective therapeutic approaches for TMD, mainly because it is a multifactorial disease that can be correlated with psychological factors.

Thus, the objective of the present study was to conduct a research correlating the psychosocial factors: anxiety and depression with the presence or absence of TMD being derived from muscle and/or joint.

Material and Methods

Ethical aspects

The study was approved by the Human Research Ethics Committee of the Federal University of Juiz de Fora (UFJF), under protocol 031943/2018. In addition, all volunteers accepted to participate in the research and signed the Free and Informed Consent Form (FICF), which contains all information regarding the research.

Type of study and location

An observational cross-sectional analytical study was carried out with patients attended at the TMJ service of the Faculty of Dentistry of the Federal University of Juiz de Fora, located in the city of Juiz de Fora/MG, Brazil.

Sample

The sample consisted of sixty patients over 18 years old, thirty of whom were already diagnosed with TMD and thirty without a previous diagnosis of any type of TMD.

Volunteers who accepted and signed the FICF were included. They were submitted to the RDC/DTM and answered the questionnaires accordingly.

The exclusion criteria were for patients who did not sign the FICF, did not answer all questionnaires, patients with medical and/or dental emergencies, individuals with neurological disorders, signs and symptoms of personality disorders according to the ICD-10, and with impairment of cognitive ability.

Data collection

Initially, patients were welcomed and then an initial interview was conducted, using the model of the cognitive interview by Ainsworth, and Pergher & Stein.[19,20] The model is structured in seven stages, which are: creation of a bond and personalized interview, explanation of the objectives of the interview, free report, questioning, recovery and extensive data, synthesis and closure.

After clarifying doubts and explaining the research objectives, the FICF was signed and the BAI (Beck anxiety inventory) and HADS (hospital anxiety and depression scale) questionnaires were completed.

Data collection instruments:

Diagnostic Criteria in Research for TMD - RDC/TMD

Axis 1 of the RDC/TMD provided a positive or negative diagnosis regarding TMD and in case of presence of TMD, classified the individual according to the group of diagnosis of each dysfunction, they are: Group I that covers TMDs of muscle origin classified as myofascial pain and myofascial pain with limited mouth opening; Group II, comprising joint disorders, including: disc displacement with reduction; disk displacement without reduction and with limited mouth opening; disk displacement without reduction and without mouth opening limitation; Group III that is related to other conditions, such as arthralgia, osteoarthritis and osteoarthrosis. This exam consists of questions about symptoms and joint locking, muscle and joint palpations, in addition to the analysis of mouth opening, excursions, protrusive, midline deviation and the presence or absence of cracklings. The version of the form used was translated into Portuguese and published by Pereira.[21]

Hospital Anxiety and Depression Scale (HADS)

The HADS is a questionnaire that has 14 questions, half of which corresponds to depression and the other half to anxiety, all questions have four answer options, each numbered from 0 to 4 points. Herein, the patient must answer the questions of how he/she felt in the last week. The final result is concluded by the sum of the scores of each answer and classification according to the following: normal (0-7), depression/mild anxiety (8-10), depression/moderate anxiety (11-14), depression/anxiety (15-21).

Beck Anxiety Inventory – BAI

The BAI was created to measure anxiety symptoms that are minimally shared with those of depression,[22] it was an instrument initially used only in psychiatric patients, but that was adapted to the general population.

It is a questionnaire formed by 21 questions, which the patient answered regarding the severity of the symptoms felt in the last week: absolutely not, slightly, moderately or seriously.

The scale of this inventory is from 0 to 3, the result being obtained by adding the score of each answer: minimum (0-7), mild (8-15), moderate (16-25), severe (26 -63).

Statistical Analysis

Data analysis was performed using the Statistical Package for the Social Science (SPSS) 14.0 program. First, the data were tabulated in absolute values with distribution of absolute and relative frequencies. Then, measures of central tendency, dispersion and association between independent variables were estimated: gender, categorized age, positive and negative diagnosis for TMD with the dependent variables: anxiety and depression established by the Chi-square test with a significance level of 5% (p <0.05).

Results

Figure 1A shows the distribution of the sample according to gender, total of 60 patients, 75% were female and 25% were male.

Figure 1B shows the distribution of the sample according to age group, in which 51.67% of the sample were between 18 and 29 years old, 20% were between 50 and 59 years old, 13.33% were between 40 and 49 years old, 8.33% were between 60 and 69 years, and 6.67% between 30 and 39 years.

Regarding the sample, 50% of the patients had a positive diagnosis for some type of TMD and 50% had a negative diagnosis for TMD (Figure 1C).

In view of the positive diagnosis for some type of TMD, we can divide it into three groups, among them: Group 1, characterized by muscular dysfunctions, which presented 30% of the sample; Group 2 characterized by joint dysfunctions presenting 66.70% and group 3 characterized by degenerative dysfunctions, presenting 3.30% (Figure 2A).

Figure 2B shows the percentage of the types of TMD that were diagnosed in the present study. Disc displacement with reduction showed 56.70% of the total sample, followed by myofascial pain, counting with 26.70%, disc displacement with no reduction was 6.70%; osteoarthrosis, disc displacement with no reduction with mouth opening limitation, pain myofascial with mouth opening limitation totalized 3.30%, and osteoarthritis and arthralgia showed 0% of cases.

From Figure 3A, the sample distribution is verified according to the presence or absence of TMD related to the

age group. It is noted that in the group 18-29 years and 50-59 years there is a higher prevalence of TMD.

In female patients, 53.30% had a positive diagnosis for TMD, while among men, the percentage of positive diagnosis for the disfunction was 40%. These results showed no significant difference between the groups (p=0.276) Figure 3B.

Figure 4A shows the distribution of the degree of anxiety in the entire sample, where 35% is considered normal or with a minimum level of anxiety, 26.70% with moderate degree, 23.70% with mild degree and 15% severe degree of anxiety.

The distribution of the degree of depression is shown in Figure 4B, in which the normal/minimum level is 75%, mild: 13.30%, severe: 7% and moderate: 5%.

Table 1 shows a significant association between degree of anxiety and the independent variables gender ($\boldsymbol{p}$=0.024), median age (p=0.033) and diagnosis for TMD (p=0.034).

The independent diagnostic variable for TMD showed a significant association with the degree of depression (p=0.029), however with the variables gender and age, there was no significant association (Table 2).

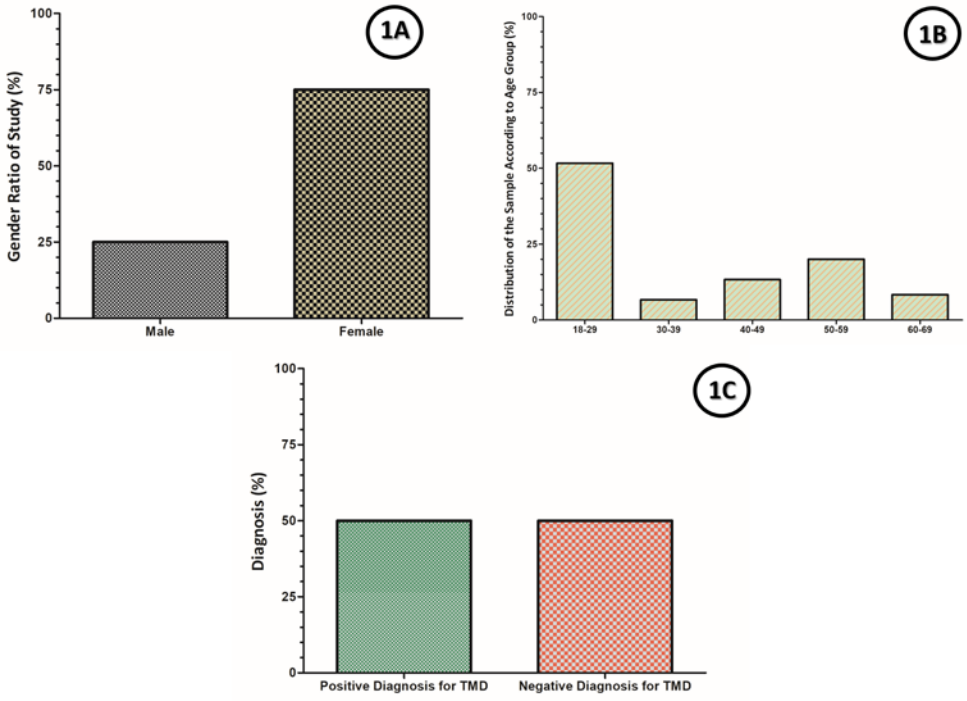

Figure 1. Distribution of samples (A) according to gender (n = 60); (B) according to age group (n = 60); (C) second diagnosis for Temporomandibular Disorder (TMD).

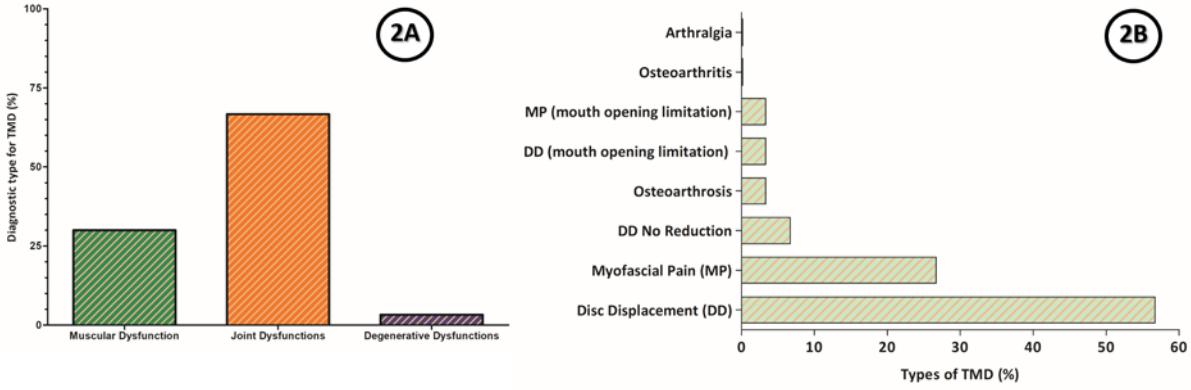

Figure 2. (A) Diagnostic groups for Temporomandibular Disorder (TMD) according to the RDC (Research Diagnostic Criteria for Temporomandibular Disorder); (B) Distribution of types of TMD.

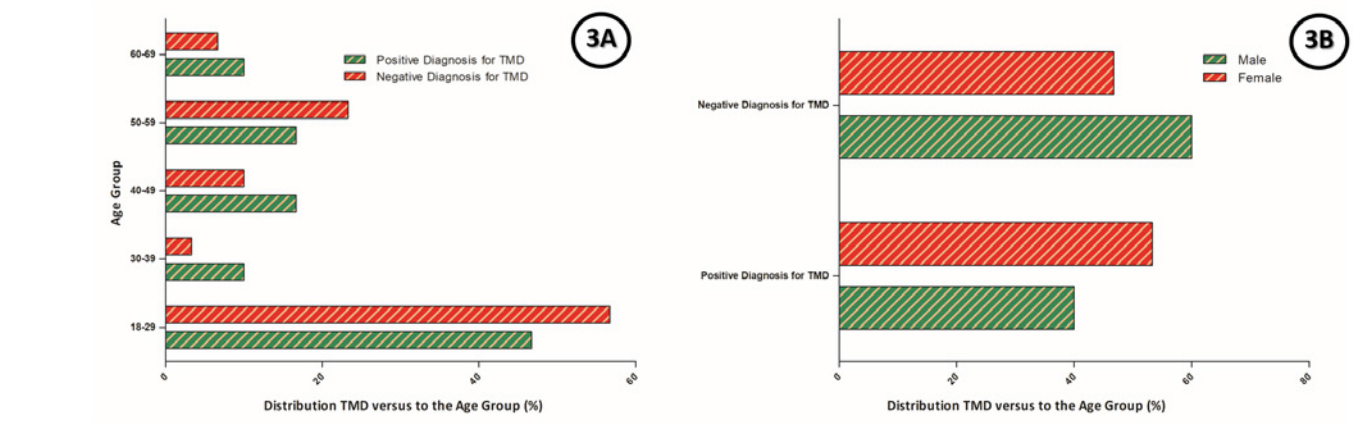

Figure 3. Presence/Absence of Temporomandibular Disorder (TMD). (A) according to age group and (B) according to gender.

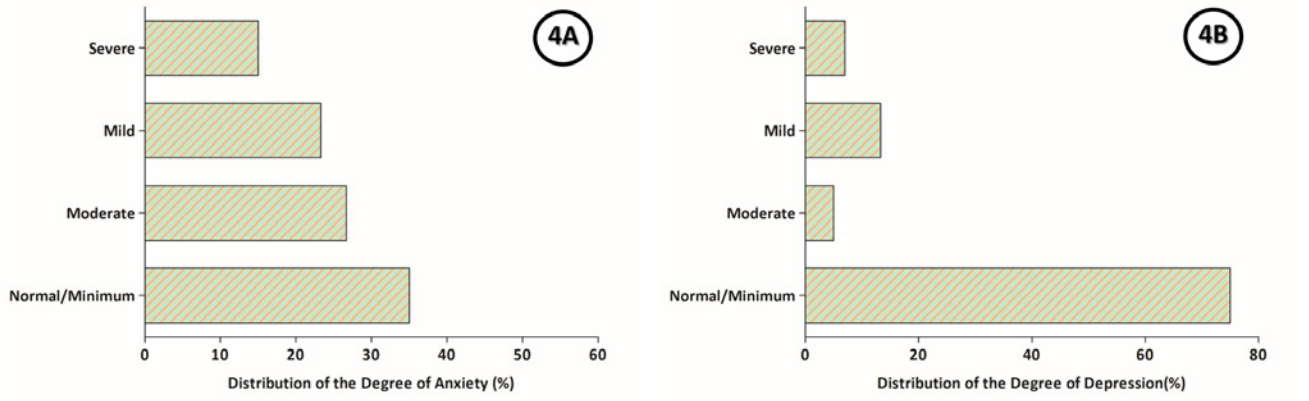

Figure 4. (A) Distribution of the degree of anxiety; (B) Distribution of the degree of depression.

Table 1. Association between the degree of anxiety and the independent variables: gender, median age and diagnosis for Temporomandibular Disorder (TMD).

	ANXIETY				
INDEPENDENT VARIABLE	**MINIMUN / NORMAL n (%)**	**MILD n (%)**	**MODERATE n (%)**	**SEVERE n (%)**	***P***
GENDER					
Male	9(42.9%)	3(21.4%)	2(12.5%)	1(11.1%)	0.024
Female	12(57.1%)	11(78.6%)	14(87.5%)	8(88.9%)	
AGE					
≤30	8(38.1%)	10(71.4%)	11(68.8%)	2(22.2%)	0.033
>30	13(61.9%)	4(28.6%)	5(31.3%)	7(77.8%)	
TMD DIAGNOSIS					
Yes	7(33.3%)	10(71.4%)	6(37.5%)	7(77.8%)	0.034
No	14(66.7%)	4(28.6%)	10(62.5%)	2(22.2%)	

Table 2. Association between the degree of depression and the independent variables: gender, median age and diagnosis for Temporomandibular Disorder (TMD).

	DEPRESSION				
INDEPENDENT VARIABLE	**MINIMUM/ NORMAL n (%)**	**MILD n (%)**	**MODERATE n (%)**	**SEVERE n (%)**	***P***
GENDER					
Male	12(26.7%)	2(25.0%)	0(0%)	1(25.0%)	0.608
Female	33(73.3%)	6(75.0%)	3(100%)	3(75.0%)	
AGE					
≤30	23(51.1%)	6(75.0%)	0(0%)	2(50%)	0.175
>30	22(48.9%)	2(25.0%)	3(100%)	2(50%)	
TMD DIAGNOSIS					
Yes	20(44.4%)	5(62.5%)	2(66.7%)	3(75.0%)	0.029
No	25(55.6%)	3(37.5%)	1(33.3%)	1(25.0%)	

Discussion

The present study sought to evaluate and correlate anxiety and depression with Temporomandibular Disorder (TMD), verifying whether psychological and psychosocial factors are significantly relevant in the prevalence of dysfunctions, however, it is a cross-sectional study, and cannot establish a cause-effect relationship. The literature still diverges on whether there is safe evidence for such relationship.[11]

According to the literature, TMD is more frequent in individuals between twenty and forty years of age,[4] and the current study confirms this fact, since in the age groups of 18 to 29 years old registered the highest prevalence (46.67% of the sample) of positive diagnosis for some type of dysfunction. Regarding the gender, authors state that there is a greater predilection for females than males,[2,3] being consistent with our results, in which 53.30% of women had some type of TMD, in contrast with 40% of men with the dysfunction. This may be related to the fact that women are more affected by bone and psychosocial pathologies than men.[16] In addition, the hormone estrogen, which is linked to the regulation of bone growth and development, can influence the peripheral and central pain mechanism.[23] However, the relationship between the female gender and the presence of TMD did not obtain a significant result (p=0.276), which can be explained by the small sample size and the majority of the sample are composed by women.

The results found in this study showed that there is a significant correlation between the presence of anxiety (p=0.034) and depression (p=0.029) in patients with TMD, that is in accordance with the study published by Calixtre *et al.*,[24] in which a coexistence of TMD signs and symptoms with psychological disorders was found, which may reflect emotional fluctuations due to personal and academic activities during the academic semester of students aged between fifteen and thirty years. In addition, Monteiro *et al.*[25] also identified a correlation between anxiety levels and degree of orofacial pain in undergraduate students, though using different objects of study. On the other hand, Tsai *et al.*[26] related the activity of the masticatory muscles in situations of experimental stress and found that there was an increase in the activation of the masseter muscle in these stress situations and, consequently, a reduction in its activities in situations of relaxation. However, researchers reported that emotional factors may not only be the cause of TMD, but also aggravating and triggering means for its signs and symptoms.[12] In the studies conducted by Akhter *et al.*[27] and Sruthi *et al.*[28], a significant correlation was observed between anxiety/depression and the signs and symptoms of TMD.

Regarding anxiety, the BAI questionnaire was used, from which it was possible to obtain a significant relationship between the independent variables: gender (p=0.024), mean age (p=0.033) and diagnosis for TMD (p=0.034) with levels anxiety: normal/minimal, mild, moderate and severe. It was also possible to observe that the majority of the sample (35%) had a minimum degree of anxiety and that it is more frequent in women and in patients with TMD. Regarding age, people under the age of thirty years old tend to have a mild to moderate degree of anxiety, while people over the age of thirty tend to have a more severe degree of anxiety. This result also coincides with studies that demonstrated that there is an association between pain and psychosocial impairment in patients with TMD.[29]

For depression, the HADS questionnaire was used. Thus, it was not possible to observe significant relationships between the independent variables gender (p=0.608), mean age (p=0.175) and levels of depression, however, the diagnostic variable for TMD was the only criteria that presented a significant relationship (p=0.029), which showed patients

with TMD tending to have mild, moderate and severe levels of depression. However, another factor to be considered is that 75% of the sample had a minimum or normal degree of depression. These results affirm this association between depression and chronic pain that have been subject of several recent works. Schmidt *et al*.[17] showed that, in a sample of depressed patients, it was found that chronic pain was connected with negative emotional experiences in childhood. However, as regards the onset of symptoms, it is still unclear whether chronic pain precedes depression, or the other way around. Although the levels of depression found in patients with TMD were minimal or absent, the existence of depressive symptoms in the sample of patients in dental care with TMD was detected.

Finally, Giannakopoulos *et al*.[18] investigated the prevalence of anxiety, depression and chronic facial pain in patients with muscle disorders, joint disorders and healthy controls, also using the HADS questionnaire, and showed a higher prevalence of depression in those patients with type I TMD (muscular origin) than in those with type II (articular), particularly among women. However, Bonjardim *et al*.[30] evaluated TMD in patients and found no evidence of anxiety or depression among patients in their sample, even though they found that the level of TMD was significantly related to anxiety.

Pain can be defined as an unpleasant sensation at the sensory and emotional level associated with real and/or potential damage, this definition is according to the International Association for the Study of Pain[31] which means that psychological factors will be of great importance in the matter of pain that is associated with dysfunctions, consequently, these factors will also have importance in the evaluation and effectiveness of treatment,[32] thus in these circumstances, it is worth remembering the importance of a multidisciplinary treatment of TMD.

Conclusion

In summary, psychological and psychosocial factors, specifically anxiety and depression, despite being subjective conditions, can be seen as factors related to the clinical pictures of temporomandibular disorders. It was also concluded that the anxiety factor is influenced by demographic factors, mainly represented by gender and age.

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