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ORIGINAL ARTICLE

Psychological Factors in Temporomandibular Disorders Patients during COVID-19 Pandemic: A Cross-Sectional Study

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ABSTRACT

Objective: To assess the influence of the COVID-19 pandemic on levels of anxiety, stress, and orofacial pain in individuals with and without TMD. **Material and Methods:** In this cross-sectional study, the participants were divided into two groups (n=10, each) experimental group (EG) TMD patients and control group (CG), without TMD. The presence of TMD was confirmed using the RDC/TMD. The Beck Anxiety Scale (BAI), Perceived Stress Scale (PSS), and Oral Analog Scale were used for assessment. The Beck Anxiety Scale is composed of 21 multiple-choice questions describing symptoms of anxiety, while the PSS is a measure that evaluates life situations as stressful. An Oral Analogue Scale was applied to each individual to quantify orofacial pain, with 0 (zero) without pain and 10 (ten) being the worst pain ever felt. The comparison between groups was performed using the Mann-Whitney test. Logistic regression was used to verify TMD dependence in relation to BAI and PSS-10. Quantitative variables were correlated with each other by Pearson's correlation coefficient. The level of significance considered for all tests was 5%. **Results:** The association was statistically significant ($p \leq 0.05$) for BAI and PSS with a TMD. **Conclusion:** Although the COVID 19 pandemic has had a psychological impact on the general population, patients with TMD have higher levels of anxiety and stress than the control group.

Keywords: Coronavirus; Anxiety; Temporomandibular Joint Disorders; Psychological Distress.

Introduction

The World Health Organization considers viral diseases a worrying threat to public health. Some epidemics caused by viruses have emerged over the past few years, such as severe acute respiratory syndrome (SARS) in 2003; influenza caused by the H1N1 subtype virus in 2009; Middle East respiratory syndrome (MERS) in 2012 and Ebola disease in 2014. In December 2019, the new coronavirus, SARS-CoV-2, appeared in Wuhan, the largest metropolitan area in China [1], and was considered pandemic in March 2020 [2].

SARS-COV-2 is highly infectious, with transmission mainly by droplets of saliva, directly between humans, via oral, nasal, and ocular routes, and by contact with contaminated surfaces [3]. Therefore, masks and social distancing are recommended to prevent the spread of Coronavirus (SARS-CoV-2) [4].

Quarantine has been adopted as a public health measure by the vast majority of countries and has been shown to have a positive role in controlling the epidemic. Prolonged social isolation, however, has negative psychological impacts, capable of causing palpitations, anxiety, insomnia, depression, anger, and stress [5].

Temporomandibular Dysfunction (TMD) is a pathology of complex and multifactorial origin, belonging to a heterogeneous group of musculoskeletal and neuromuscular conditions promoting signs and symptoms in the temporomandibular joint, in the masticatory musculature, and in adjacent structures. The prevalence of TMD signs and symptoms varies from 20 to 75% in the general population, with severe cases requiring treatment being 2-4%. It is four times more prevalent in women [6].

The etiology of TMD is multifactorial, not having a single triggering factor but several contributing and perpetuating factors. Among TMD risk factors, biopsychosocial factors must be considered both in the etiology and in the triggering of signs and symptoms [7]; these factors can cause the overactivity of the masticatory muscles, being one of the causes of myofascial pain [8].

Psychological factors act on the hypothalamic Pituitary Adrenal axis (HPA), increasing the serum level of cortisol, and influencing the physiological behavior of the Stomatognathic System, highlighting the importance of these factors in triggering and perpetuating TMD [9]. In addition, TMD patients demonstrate high levels of anxiety and depression, which highlights its importance in the etiology and interdisciplinary treatments [10].

The aim of this study is to assess the influence of the COVID-19 pandemic on levels of anxiety, stress and orofacial pain in individuals with and without TMD.

Material and Methods

Ethical Clearance

The present study was submitted to the Human Research Ethics Committee of the São José dos Campos Institute of Science and Technology - ICT-UNESP (CAAE n° 32339620.6.0000.0077). Participants were informed about the research objectives and procedures and authorized participation by text message.

Study Design, Sample and Selection Criteria

The research was a comparative cross-sectional study, with data obtained by telephone to complete a questionnaire. The sample size was estimated in the GPower program for a test power of 90% (alpha, type I error = 5%) and with the assumption "effect size" = 0.30. For this study, it was determined an "n" of 20. Research participants were divided into two groups: 1- experimental (EG), 10 patients with TMD and 2- control (CG), 10 individuals without TMD. The inclusion criteria: women over 18 years old. The non-inclusion criteria: male, patients with psychiatric disorders, pregnant and having been previously infected with COVID-19. Participants were excluded when the diagnoses of TMD could not be confirmed.

The EG participants were selected from the database of patients who looked for treatment in the Center of Occlusion and Temporomandibular Joint (COAT), ICT UNESP. The presence of TMD was confirmed using the RDC/TMD (Research Diagnostic Criteria / Temporomandibular Disorders) axis I, validated in Portuguese [11], in the year of 2018.

The CG were volunteers recruited from social media. In this group, due to social isolation, they could not be examined in person. Thus the reason we used the TMD pain screener by DC/TMD (Diagnostic Criteria Temporomandibular Disorders) [12]. The purpose of this validated rapid test is to select in which patients the completed application should be followed. When the result of pre-screening is negative, the patients are supposedly with no TMD. The same researcher performed the telephone interview for both groups in May 2020. For the EG was applied the psychological tests. For the CG was first applied the TMD pain screener, and only for those without TMD, the psychological tests were carried out.

Scales Applied in the Study

In the present study, the BAI and PSS-10 scales were applied. The Beck Anxiety Scale is composed of 21 multiple-choice questions describing anxiety symptoms. There are four answer options: a) no (score 0); b) soft, it doesn't bother me much (score 1); c) moderate, it is unpleasant, but I can bear it (score 2); d) severe, I can hardly bear it (score 3). The sum of the scores obtained corresponds to the degree of anxiety: 0 - 10 (minimum); 11 - 19 (light); 20-30 (moderate); and 31 - 63 (severe). A score > 11 shows a high probability of anxiety disorder [13].

The Stress Perception Scale [14] is a global measure that evaluates through the sum of 10 questions about life situations as stressful in the last month according to the description by Reis et al. [15]. An Oral Analogue Scale was applied to each individual to quantify orofacial pain, with 0 (zero) without pain and 10 (ten) being the worst pain ever felt. Symptomatic patients were asked whether the pandemic influenced orofacial pain symptoms, informing whether there was an improvement or worsening.

Statistical Analysis

The Bioestat Software, version 5.3, was used to perform statistical analyzes. Quantitative variables were described by means and standard deviations. The Shapiro-Wilk test was used to assess the normality of the frequency distributions into the groups. The comparison between groups was performed using the Mann-Whitney test. Logistic regression was used to verify TMD dependence in relation to BAI (Beck Anxiety Scale) and PSS-10 (Perceived Stress Scale). Quantitative variables were correlated with each other by Pearson's correlation coefficient. The level of significance considered for all tests was 5% (p-value ≤ 0.05).

Results

The experimental and control groups were composed of independent samples. This study consisted of 20 women (10 with TMD and 10 without TMD). The age varied between 21 and 76, and the mean was 52.6 years.

The BAI scale showed that the mean value of the experimental group was higher than that of the control group, 16,900 and 7,700, respectively. In the PSS test, the mean values were also higher in the experimental group with 19,900 and in the CG of 14,300 (Table 1). There were no statistically significant differences between the study groups (Figures 1 and 2).

Table 1. Minimum, maximum, average and standard deviation values of BAI and EPS values.

Variables	Minimum	Maximum	Mean	Std. Deviation
BAI (GC)	1.000	18.000	7.700	5.736
BAI (GE)	5.000	42.000	16.900	13.254
EPS (GC)	8.000	35.000	14.300	8.233
EPS (GE)	8.000	30.000	18.900	6.919

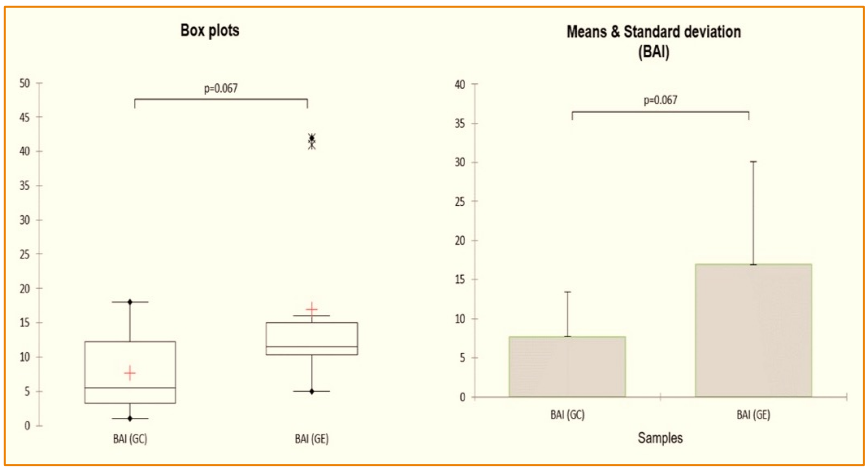


Figure 1. Comparison between BAI control and experimental BAI groups.

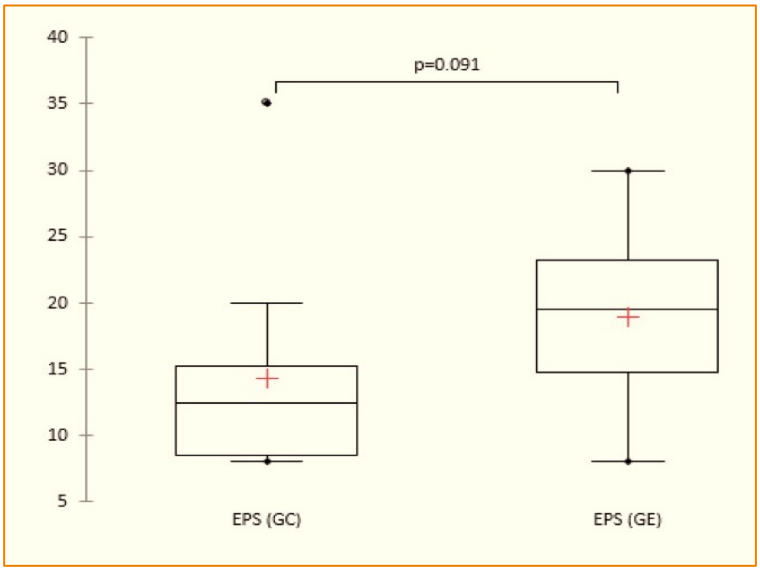


Figure 2. Comparison between the control EPS and experimental EPS groups.

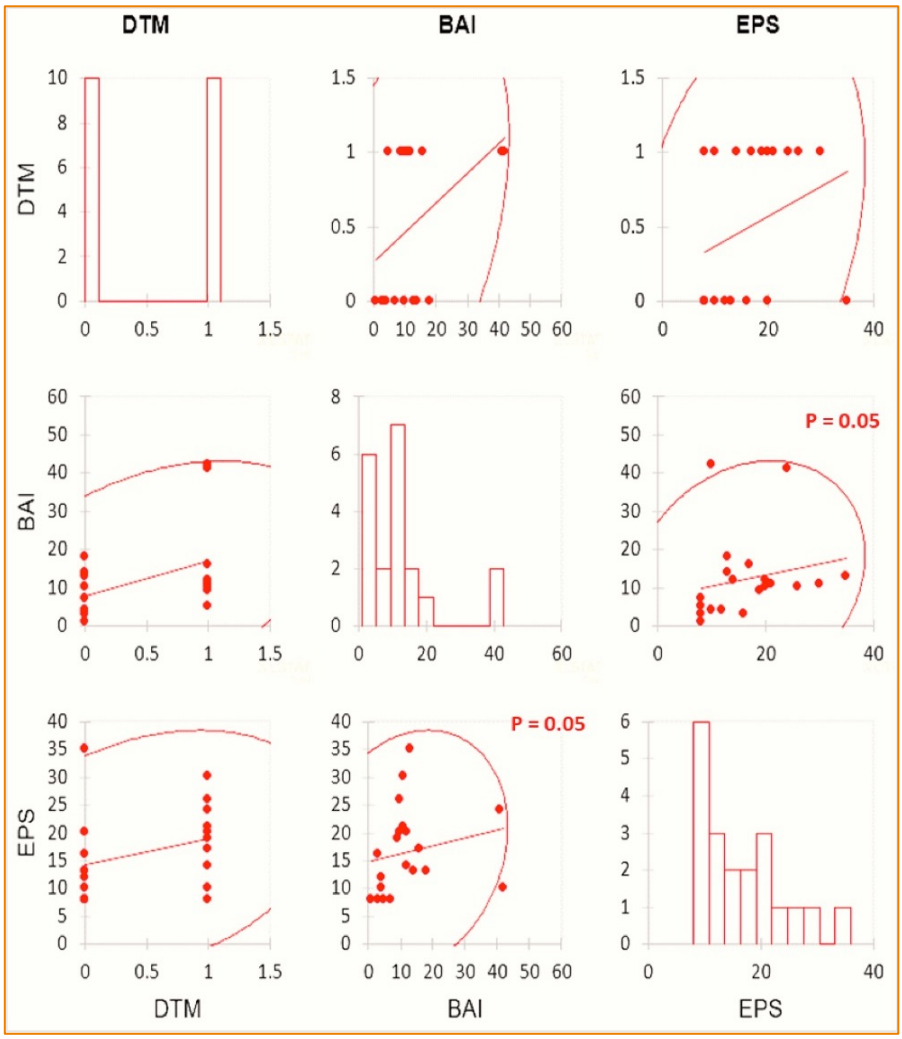
The logistic regression was used to verify TMD dependence in relation to BAI and PSS. The results of the BAI and PSS regression coefficients were higher than alpha (0.05), which indicates that the dependence is not significant (Table 2).

The association between variables was analyzed using Spearman's correlation. The BAI and PSS scores correlated in a statistically significant way ($p \leq 0.05$), direct and weak with TMD, so there is an association between the variables (Figure 3). In those subjects with facial pain, we found a mean value of 4.5 on

the oral analog scale. Fifty percent of patients reported improvement in pain, while the other fifty percent reported worsening in the pandemic period.

Table 2. Logistic regression model to estimate the probability of BAI and PSS to the occurrence of TMD.

Variables	Coefficients	Std. Deviation	Z	p-value	Odds Ratio	IC 95%
Intercepto	-2.3932	1.4516	-	-	-	-
X1	0.1228	0.0935	1.3130	0.1892	1.1307	0.94 to 1.36
X2	0.0615	0.0747	0.8232	0.4104	1.0634	0.92 to 1.23



These are sets of graphs, a matrix of graphs representing histograms for each variable, which show how the data is distributed. In addition, there are scatter plots for all combinations of variables. Statistically significant when p≤0.05.

Figure 3. Correlation between DTM, BAI and EPS.

Discussion

The pandemic caused by COVID-19 brought a global public health crisis; in addition to the growing number of cases, it also had a socio-economic, political and psychological impact [16]. The psychological impact of social isolation may be increased in patients with pathologies with psychological components involved [17].

TMDs are a group of diseases that are influenced by the emotional state of patients [18]. This heterogeneous group of musculoskeletal and neuromuscular diseases involves the temporomandibular joint complex, musculature and adjacent components [19]. The somatic symptom is the strongest psychosocial predictor of TMD incidence [20]; because of this, we decided to investigate this factor in this study.

The highest prevalence of TMD occurs in women, so we included only that gender in the study. Women are more susceptible to these disorders and are more likely to experience painful symptoms. This suggests a differentiation in the activation of the endogenous analgesia system and the central processing of nociceptive stimuli. Women activate autonomic and affective areas more in addition to having female sex hormones playing an important role in painful sensitivity [21].

The Beck Inventory (BAI) was used to assess anxiety symptoms in patients with TMD. In this study, the scores of patients in the experimental group (EG) were higher, with a maximum of 42; while in the control group (CG) it was 18. The means were also higher with 7.7 (CG) and 16.9 in (GE), although the groups have no statistically significant difference between them, as for the correlation test, it can be observed that the correlation of TMD and BAI was statistically significant. Suggesting that anxiety has some influence on temporomandibular disorders. Several studies have shown high levels of anxiety in these patients [8,22,23].

Stress was analyzed using the perceived stress scale (PSS). Perceived stress is how much the person feels the situations in which they are inserted as stressful. In this research, the results showed that the group of patients with TMD had an average with higher TMD levels than the control group. Although the comparison between the groups was not statistically significant, and the logistic regression did not show dependence between TMD and EPS, the correlation between TMD and stress was statistically significant [14,15].

A concern commonly associated with TMD and orofacial pain is the patients' psycho-emotional state [8]. Psychological, somatic and psychosocial complaints are often related to psychological distress, requiring careful assessment of the biopsychosocial factor [17].

In the studied groups, we found higher mean values in the PSS of individuals with TMD. Our results are in accordance with a study that evaluated the prevalence of TMD and its association with perceived stress and common mental disorders in 586 students, and significant correlations were observed between TMD and perceived stress [24].

The COMT genotype (catechol O - methyltransferase gene) was associated with TMD. COMT has the function of regulating the catabolism of the neurotransmitter catechol, an essential process in the stress response [20]. Therefore, the COVID-19 pandemic and the need for social isolation, can generate psychological impact, and mainly affect patients with TMD and bruxism [17], as there is an increased risk of these patients developing global psychological problems [20].

The rules during the pandemic have profoundly changed lifestyles and social relationships, which are likely to generate deep anxiety levels. Thus, psychological conditions may be compromised during the COVID-19 outbreak [25]. Although these social isolation measures are important to reduce the outbreak of COVID-19, it creates psychological distress for the population. The quality of sleep and anxiety symptoms in people who have gone through post-traumatic events have been reflected in negative aspects of general health. Studies carried out in the Chinese and Italian population during the pandemic showed a relationship between anxiety, depression, distress, sleep disorders and post-traumatic stress disorders, not only due to the impact of the infection but also by the isolation measures to control the coronavirus outbreak [26,27].

Conclusion

Although the COVID 19 Pandemic has had a psychological impact on the general population, TMD patients had higher levels of anxiety and stress than the control group, suggesting the psychological component as a risk factor for TMD. In addition, half of TMD patients reported worsening orofacial pain, and half improved.

Authors' Contributions

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DLO	https://orcid.org/0000-0001-7340-2834	Conceptualization, Methodology, Formal Analysis, Investigation, Data Curation, Writing - Original Draft and Writing - Review and Editing.
SMR	https://orcid.org/0000-0002-4261-4217	Conceptualization, Methodology, Validation, Formal Analysis, Investigation, Data Curation, Writing - Original Draft, Writing - Review and Editing and Supervision.
All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.		

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None.

Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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