

The prevalence of signs and symptoms of temporomandibular dysfunction in academics of a university center: association of emotional frameworks

A prevalência de sinais e sintomas de disfunção temporomandibular em acadêmicos de um centro universitário: associação de quadros emocionais

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ABSTRACT

BACKGROUND AND OBJECTIVES: Recent research has shown that undergraduate students are more susceptible to stressful situations due to the need to exercise various skills, and that this factor is a potential trigger for temporomandibular joint dysfunction (TMD) syndrome. In view of this, there is a need to highlight, through scientific studies, the fact that young students may be more vulnerable to the development of anxiety and stress, which is also associated with the incidence and/or development of bruxism and TMD. The present study's objective was to describe the intensity of symptoms of anxiety, depression and stress and to characterize the presence and severity of TMD symptoms in dentistry students.

METHODS: The sample consisted of 118 students. All of them completed the *Índice Anamnésico de Fonseca* (Fonseca Anamnesis Index - IAF) questionnaire and the shortened version of the Depression, Anxiety and Stress Scale (DASS-21), which provide relevant information about the sample under investigation and allowed us to acquire epidemiological data about TMD symptoms, associated risk sources and repercussions on quality of life. The data was tabulated and categorized. Descriptive statistical analysis and linear association between the scales are presented.

RESULTS: In response to the DASS-21, the three subscales showed that 51% of the individuals had some level of depression, 54% some degree of stress and 61% some level of anxiety. The

presence of TMD symptoms was present in 67% of the sample. There was a linear association between the intensity of symptoms of the three subscales of the DASS-21 and the severity of symptoms according to the IAF.

CONCLUSION: The information and results obtained in this study revealed a prevalence of signs of anxiety and TMD symptoms in dentistry students.

Keywords: Anxiety, Dentistry, Depression, Psychological stress, Temporomandibular joint dysfunction syndrome.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Pesquisas recentes alertam que acadêmicos do curso de graduação estão mais suscetíveis a situações de estresse devido à necessidade de exercer diversas habilidades, esse fator é um potencial desencadeador da síndrome da disfunção da articulação temporomandibular (DTM). Diante disso, surge a necessidade de evidenciar, mediante estudos científicos, o fato de que os estudantes jovens podem mostrar-se mais vulneráveis para o desenvolvimento de ansiedade e estresse, estando também associada a incidência e/ou desenvolvimento do bruxismo e da DTM. O objetivo deste estudo foi descrever a intensidade dos sintomas de ansiedade, depressão, estresse e caracterizar a presença e gravidade dos sintomas de DTM em acadêmicos de odontologia.

MÉTODOS: A amostra foi de 118 acadêmicos. Todos preencheram o questionário e Índice Anamnésico de Fonseca (IAF) e a versão reduzida da Escala de Depressão, Ansiedade e Estresse (DASS-21), os quais fornecem informações relevantes sobre a amostra investigada e permitiu adquirir dados epidemiológicos acerca de sintomas de DTM, fontes de risco associadas e repercussão sobre a qualidade de vida. Os dados foram tabulados e categorizados. Apresenta-se a análise estatística descritiva e associação linear entre as escalas.

RESULTADOS: Em resposta ao DASS-21, as três subescalas demonstraram que 51% dos indivíduos apresentam algum nível de depressão; 54% algum grau de estresse e 61% algum nível de ansiedade. A presença de sintomas de DTM está presente em 67% da amostra. Houve uma associação linear entre a intensidade dos sintomas das três subescalas da DASS-21 com a gravidade dos sintomas pelo IAF.

CONCLUSÃO: As informações e resultados obtidos no presente estudo revelaram prevalência de sinais de ansiedade e sintomas de DTM em acadêmicos do curso de Odontologia.

Descritores: Ansiedade, Depressão, Estresse psicológico, Odontologia, Síndrome da disfunção da articulação temporomandibular.

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HIGHLIGHTS

- The association between anxiety and temporomandibular dysfunction (TMD) in health academics;
- Existence and severity of TMD symptoms;
- Health professionals present high levels of anxiety.

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INTRODUCTION

The close link between mental well-being and oral health has sparked debate and discussion on the subject, with the main factors being behavioral and biological. According to behavioral characteristics, these are situations that cause stress and can lead to depression and anxiety, conditions that contribute to poor oral health. This is reported as a consequence of stress and anxiety, which can lead to an inadequate oral care routine. The cause of temporomandibular dysfunction (TMD) involves a variety of reasons, and is hardly associated with just one factor; however, it should be noted that there may be several factors that contribute to the cause of this dysfunction¹⁻³.

Individuals with TMD report higher levels of anxiety and stress than those without the dysfunction, which highlights the relevance of stress and anxiety in the etiology and interventions for multidisciplinary treatment. TMD is a condition that depends on the psychological aspects of the patient, as well as their well-being⁴. TMD is characterized as a cluster of disorders affecting the muscles of mastication, the temporomandibular joint (TMJ) and its structures⁵.

Study⁶ reports that academics are more likely to be affected by psychological disorders and mental anguish. The authors⁷ showed a high prevalence of TMD in different age groups, which would indicate the need to implement the “Temporomandibular Dysfunction and Orofacial Pain” specialty in medium-complexity dental care, especially in Dental Specialty Centers (DSC). The introduction of this specialty would ensure comprehensive dental care for a huge portion of the community that suffers from the signs and symptoms of this dysfunction, preventing more serious problems and improving their Quality of Life (QoL).

Myofascial pain and discomfort are recurrent in society, with bruxism being one of the main risk factors. Individuals living with TMD also suffer from sleep complications, low self-esteem, fatigue, lack of libido, depression and decreased appetite, all of which affect QoL⁸.

After several studies and surveys correlating anxiety and stress levels as triggering factors for TMD, authors have come to the conclusion that there is a close and balanced association between TMD and anxiety in university students examined regardless of the time they've been in school⁹.

According to current research, dental students are susceptible to stressful situations due to the fact that they need to exercise a variety of skills, not only in the theoretical sphere, but also in clinical environments due to the fact that procedures vary according to their target audience, thus requiring correct handling of care¹⁰.

The objective of this study was based on the need to highlight the fact that young students may be more vulnerable to the development of anxiety and stress, conditions that may be associated with the incidence and/or development of bruxism and TMD due to emotional overload, judging by the pandemic moment in which all academic perspectives have changed, directly impacting on their daily lives. It is

therefore of great value to discuss in the oral health field the need to understand the emotional conditions of patients undergoing treatment for TMD, not just physical factors.

The present study's objective was to assess the severity of TMD signs and symptoms in undergraduate dental students from the INTA University Center - UNINTA. As a secondary objective, the study provided a self-report of the intensity of symptoms of anxiety, stress and depression.

METHODS

This is a quantitative, cross-sectional descriptive field study using a virtual questionnaire to access the perceptions of undergraduate dentistry students at the INTA – UNINTA University Center, based on Fonseca's¹¹ anamnesis questionnaire on the influence of stress and anxiety on their oral health.

Google Forms[®] was chosen because it is a tool that provides a simple, lightweight and free basis for composing targeted forms, which can archive and examine the answers to a survey in spreadsheets that can be prepared in graphs or in form^{12,13}.

This study was carried out with students at the INTA-UNINTA dental clinic in the municipality of Sobral, in the state of Ceará's country side, in northeastern Brazil. Data was collected from March to April 2022.

The sample was calculated taking into account the total number of 168 students enrolled. The OpenEpi.com website, version 3, an open-source calculator, which was used to calculate the number of questionnaires needed to obtain a 95% confidence level. The calculation used by this site to arrive at the confidence number is: $sample\ size\ n = [EDFF * Np(1 - p)] / [d^2/Z^2(1 - \alpha/2 * (n - 1) + p * (1 - p))]$.

The inclusion criteria were students regularly enrolled in the Dentistry course at the INTA – UNINTA University Center, taking courses between the 5th and 10th semesters. The exclusion criteria were students who reported using drugs that interfere with TMD symptoms and those diagnosed with other diseases that have repercussions on the development and severity of TMD.

Data was collected through questionnaires applied virtually. Questionnaires that are shared and applied online enable participants to be reached more widely¹³. Students at the UNINTA dental clinic were approached via a questionnaire published on social media, preceded by the reading and acceptance of the Free and Informed Consent Term (FICT) and a predetermined deadline for completing the answers. The content of the questionnaire aimed to find out about dental students' comprehension of stress and anxiety in the development of oral lesions, diseases and alterations. This questionnaire was applied online to UNINTA students. To assess the existence and/or severity of TMD, a questionnaire structured according to Helkimo's anamnesis was used.

This questionnaire consists of 10 questions with the possibility of one of three answers: “yes”, “sometimes” or “no”, with a score of 10 points for each “yes”, 5 points for each “sometimes” and zero for each “no”. The *Índice Anamnésico*

de Fonseca (Fonseca Anamnesis Index - IAF) is categorized as “no TMD” (zero to 15 points), “mild TMD” (20 to 45 points), “moderate TMD” (50 to 65) and “severe TMD” (70 to 100 points)¹¹.

The reduced version of the Depression, Anxiety and Stress Scale (DASS-21) was used to assess the level of stress and anxiety. The DASS-21 has been validated for use in Brazilian Portuguese, is a self-completed questionnaire and allows you to access the intensity of emotional symptoms. Each symptom is measured by subscales that can be categorized by intensity: stress (zero-10 = normal; 11-18 = mild; 19-26 moderate; 27-34 = severe; 35-42 = extremely severe); anxiety (0-6 normal; 7-9 = mild; 10-14 = moderate; 15-19 = severe; 20-42 = extremely severe); depression (zero-9 = normal; 10-12 = mild; 13-20 = moderate; 21-27 = severe; 28-42 = extremely severe). The scores on the DASS-21 must be multiplied by 2 to obtain the final value for each sub-scale¹⁴.

The data was analyzed and processed by systematizing the data obtained through the collection instrument. A descriptive statistical analysis was carried out which included characterizing the members who took part in the study using the simple frequency of the variables collected. The association between the DASS scales and the IAF was analyzed using the chi-square test, with a 95% CI and a p-value of <0.05. The SPSS software version 23 was used to carry out the statistical tests.

Ethical aspects

This study was submitted for evaluation by the Research Ethics Committee INTA – UNINTA University Center. This project followed the rules of Resolution 466 of December 12, 2012, which deals with guidelines and regulatory standards for research involving human beings. This study received final approval from the ethics committee with Opinion number: 5.284.826, on 10/03/2022.

As for the ethical aspects provided for in the Circular Letter No. 02 of February 24, 2021, from the *Comissão Nacional de Ética em Pesquisa* (National Research Ethics Commission - CONEP), which establishes guidelines for procedures in research with any stage in a virtual environment, the research participants were presented with the risks and benefits to which they would be subject, the guarantee of anonymity and that they could withdraw from the study at any time, as well as the request for consent to disclose the data collected by signing the FICT, which accompanied the questionnaire applied virtually.

RESULTS

A total of 118 questionnaires were sent out, of which 116 were returned. The majority of the sample was female, accounting for 68.97%. Ages ranged from 18 to 41, with an average of 23.2 years±3.8. When approaching age by age group, the highest concentration of students was between 18 and 24 years old, totaling 81.89%. However, 3.45% of the students were aged 35 or over. It’s worth noting that

most of the students who responded and took part in this survey were in their ninth term at UNINTA’s School of Dentistry (Table 1).

With regard to the intensity of the affective-emotional states found in the sample, 51% of the individuals who took part in the study had some kind of depression, with 7% of them at severe or very severe levels; 54% had some degree of stress, with 21% at severe or very severe levels; and 61% had some level of anxiety, with 31% at severe or very severe levels, as shown in table 2.

Table 3 shows the absolute number and percentages of the answers given by the participants in the IAF. The data shows that the question with the highest rate of positive statements was number 8 (54.3%), followed by question 10 (40.5%). Table 4 shows the frequencies of prevalence and intensity accessed by the IAF.

The Chi-square test was applied to check for a linear association between affective-motivated symptoms and the intensity of TMD. It showed a significant association between TMD symptoms (IAF) and symptoms of depression (p<0.001); symptoms of anxiety (p<0.001) and symptoms of stress (p<0.05), all in the direction of increasing symptom intensity with the presence and severity of TMD. Table 5 shows the number of participants in the sample in each category of association between the IAF and the DASS-21 sub-scales.

Table 1. Sample demographic profile

Variables	n	%	p-value
Gender			
Female	8	68.97	<0.0001 (Binomial test)
Male	3	31.03	
Age group (years)			
18 to 24	9	81.89	<0.0001 (Kruskal-Wallis)
25 to 29	1	11.21*	
30 to 34	4	3.45*	
35 to 41	4	3.45*	

There was a significant difference when comparisons were made with the “18 to 24 years old” group.

Table 2. DASS-21 scores (n=116) - Levels of depression, stress and anxiety

DASS levels	Depression	Stress	Anxiety
Minimal/Normal	58 (50%)	54(47%)	46(40%)
Mild	25 (22%)	16(14%)	10(9%)
Moderate	25 (22%)	22(19%)	24(21%)
Severe	6 (5%)	21(18%)	10(9%)
Very Severe	2 (2%)	3(3%)	26(22%)
Total	116 (100%)	116(100%)	116(100%)

DASS-21 = Depression, Anxiety and Stress Scale.

Table 3. IAF for the study's sample

	n	%
1. Do you find it difficult to open your mouth?		
Yes	3	2.6
No	99	85.3
Sometimes	14	12.1
2. Do you find it difficult to move your jaw sideways?		
Yes	6	5.2
No	100	86.2
Sometimes	10	8.6
3. Do you experience tiredness and muscle pain when chewing?		
Yes	15	12.9
No	74	63.8
Sometimes	27	23.3
4. Do you often get headaches?		
Yes	37	31.9
No	51	44.0
Sometimes	28	24.1
5. Do you feel pain in the back of your neck or neck stiffness?		
Yes	24	20.7
No	66	56.9
Sometimes	26	22.4
6. Do you have ear or joint (TMJ) pain?		
Yes	12	10.3
No	88	75.9
Sometimes	16	13.8
7. Have you noticed any noises in your TMJ when chewing or opening your mouth?		
Yes	34	29.3
No	71	61.2
Sometimes	11	9.5
8. Have you ever noticed any habits such as clenching and/or grinding your teeth (chewing gum, biting a pencil or your lips, biting your nails)?		
Yes	63	54.3
No	36	31.0
Sometimes	17	14.7
9. Do you feel that your teeth don't articulate well?		
Yes	19	16.4
No	87	75.0
Sometimes	10	8.6
10. Do you consider yourself a tense or nervous person?		
Yes	47	40.5
No	26	22.4
Sometimes	43	37.1

Table 4. IAF Scores (n=116)

Intensity	IAF n (%)
No TMD	38 (32.8)
Mild	54 (46.6)
Moderate	11 (9.5)
Severe	13 (11.2)

Table 5. Distribution of the sample (n=116) between the IAF categories and the DASS-21 sub-scales.

		Fonseca Anamnesis Index - IAF			
		No symptom	Mild	Moderate	Severe
DASS-21 Depression	Minimal	23	30	1	4
	Mild	10	11	2	2
	Moderate	5	11	4	5
	Severe	0	1	4	1
DASS-21 Anxiety	Minimal	22	20	1	3
	Mild	1	9	0	0
	Moderate	11	10	0	3
	Severe	0	5	3	2
DASS-21 Stress	Minimal	4	10	7	5
	Mild	18	13	1	1
	Moderate	11	20	1	5
	Severe	6	13	6	6
	Very Severe	2	7	3	1
	Very Severe	1	1	0	0

DISCUSSION

The present study's results show that 67% of undergraduate dental students report signs and symptoms of TMD, most of them mild, but 20% with moderate-severe symptoms. Anxiety was present at some level among 60% of the students. There was an association between the severity of TMD symptoms and the intensity of anxiety, stress and depression symptoms.

Numerous studies claim that depression is one of the main reasons for the presence of TMD, raising questions and countless investigations into the role of psychological factors, especially depression, in the onset and/or worsening of TMD¹⁴. The authors¹⁶ reported a high tendency for anxiety and depression among university students and indicated that these results can interfere and influence the onset of TMD-related symptoms, with more regularity in the age group between 20 and 40 years old, similar to the present study.

Other authors^{17,18} have reported and estimated that depression is a cause of TMD and not just a characteristic of TMD. However, it cannot be confirmed that depression, for example, is caused by TMD or that TMD is an effect of depression. The literature has yet to show how TMD is related to depression and how depression can act at the onset of such disorders. This finding (lack of a relationship between TMD and psychological disorders) applies not only to depression, but also to anxiety and stress.

Some authors have presented a link between psychological disorders (depression, anxiety and stress) and TMD. It is not clear from the literature how this correlation exists, i.e. whether it is TMD that can cause these stresses and disorders, or whether it is the psychological disturbances that cause the dysfunction¹⁹. Excessive stress tends to induce the onset or

progression of TMD²⁰ and this symptom is a relevant aspect to be analyzed in the development and onset of some disorders in the stomatognathic system, including TMD, periodontal disease, herpes simplex, lichen planus and aphthous ulceration¹.

As for the correlation between anxiety and TMD, the results of the studies examined show that it cannot be claimed that anxiety caused or was even a consequence of TMD²¹.

Anxiety has a strong link with TMD. Aiming to control the dysfunction, it is likely that there will be considerable relief in the symptoms of the disease with the reduction of peaks of anxiety, thus favoring a better quality of life, as these factors are directly related to the patient's social and academic development²². One of the risk factors for TMD is anxiety³⁴, considering that individuals with this condition have a more acute understanding of pain, so it has been found that most patients with this condition are usually anxious, but not all anxious patients have TMD. In addition, the trait and anxiety classification chart showed that the dentistry course expressed the level of anxiety classified as "very high"²⁴.

The authors²⁵ reported in their research that health academics exhibit different levels of anxiety, which increase during the time they are in school. This can be explained by the lack of psychological assistance, which leads to the emergence of numerous disorders which, as well as having consequences for the individual's emotional state, show physical signs in the body, such as TMDs.

Numerous studies have been carried out to assess TMD in different audiences with different occupations and age groups²⁶. The activity of anxiety and stress on the pain caused in the masticatory muscles is now recognized.

In the present study, the IAF was used because it is a quick and accessible instrument, and because the sample was not made up of individuals who were seeking treatment for TMD; consequently, the primary intention was just to investigate and look for signs and symptoms of this dysfunction in university students²⁷.

Regarding the existence of parafunctions, in a study similar to this one, there was a 53% prevalence of parafunctional habits, with bruxism having a prevalence of 23.4%, followed by nail biting with 13.3% and thumb sucking with 23.4%, resulting in a positive link between parafunctional habits and TMD. Thus, the statistical significance of the correlation between TMD and parafunctional habits was verified²⁸.

This study found a high prevalence of TMD symptoms and clinical signs. With regard to the severity of TMD, most of the female volunteers had mild TMD. It should be noted that the severity of TMD was based on the symptoms reported by the participants in the questionnaire. The higher percentage of individuals with mild TMD compared to the other degrees of TMD was also observed and verified in the study²⁹.

There is evidence that the higher the levels of TMD, the lower the individual's quality of life³⁰. In the present study, when the association between the IAF scores and DASS-21 subscale scores was observed, a significant directly proportional moderate correlation was found.

Studies on the adult academic population have reported a high correlation between TMD and depressive and anxious states³¹. The study³² found that nursing academics had the highest level of anxiety and stress among health academics.

According to the study³³, individuals who work in the health sector exhibit high levels of anxiety, a condition that begins and evolves during their undergraduate years, data and information that is in agreement with the present study, which ratifies the same information. The authors³³ describe that painful stimuli generated by the face, TMJ and neck can increase the activity of the cochlear nucleus of the auditory pathways, causing the patient to become depressed, and tinnitus can also lead to an increase in depression, thus creating a "vicious circle" in the individual's daily life.

Thus, TMD can be associated with a high degree of depression, information which is in line with the present study, which observed that 51% of the individuals who took part in the survey had some kind of depression, with 7% of them at severe or very severe levels; 54% had some degree of stress, with 21% at severe or very severe levels; 61% had some level of anxiety, with 31% at severe or very severe levels; and 67.4% had some degree of TMD involvement.

There was a high prevalence of emotional tension and anxiety (61%). Depression was present in 51% of the sample. These results are in line with previous studies which also show a high prevalence of emotional factors in this population³⁴.

As mentioned before, several studies have observed a considerable association between anxiety and depression and the presentation of signs and symptoms of TMD³⁵. The present study found a strong presence of emotional tension and anxiety, which strengthens the evidence of the great emotional pressure to which academics are being subjected, and these conditions were statistically related to the presence of signs and symptoms of TMD, which may suggest that this sample group is subjected to significant risk factors for the onset and development of this disorder.

According to the present study's results, stress, anxiety and depression can be considered risk factors for TMD and are capable of directly inducing the onset and/or progression of TMD. It can therefore be suggested that there is a certain influence of psychological factors on TMD. The mechanisms by which psychological factors have an impact are unclear. Therefore, more research is needed to better elucidate this association.

The results obtained in this study indicate that females are the most affected by TMD and that women with this condition have a lower quality of life when compared to women who are not affected and do not suffer from TMD. The reason for this is still unclear, but it may be due to women seeking treatment more often, as well as the greater pain sensitivity of the muscles that surround the joint, such as the masseter, temporalis and upper trapezius, and a possible link between its pathogenesis and the female sex hormone oestrogen, or between TMD and the means of modulating pain, since women have greater excitability to most pain modalities³⁶.

CONCLUSION

The information and results obtained in the present study revealed a prevalence of signs of anxiety and TMD symptoms in UNINTA dentistry students who are between their fifth and tenth terms. Future research should seek to better comprehend this association.

AUTHORS' CONTRIBUTIONS

Matheus Mendes Carneiro Loiola

Statistical Analysis, Conceptualization, Research, Software

Francisca Mariane Martins Monte

Data collection, Methodology, Writing - Review and Editing

Luís Henrique dos Santos Nogueira

Supervision, Validation, Visualization

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