ASSOCIATION BETWEEN TEMPOROMANDIBULAR DYSFUNCTION AND ANXIETY IN DENTISTRY STUDENTS: EPIDEMIOLOGICAL STUDY

ASSOCIAÇÃO ENTRE DISFUNÇÃO TEMPOROMANDIBULAR E ANSIEDADE ENTRE ESTUDANTES DE ODONTOLOGIA: ESTUDO EPIDEMIOLÓGICO

ASOCIACIÓN ENTRE DISFUNCIÓN TEMPOROMANDIBULAR Y ANSIEDAD EN ESTUDIANTES DE ODONTOLOGÍA: ESTUDIO EPIDEMIOLÓGICO

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ABSTRACT

According to the American Academy of Orofacial Pain (AAOP), temporomandibular disorders (TMD) comprise a set of musculoskeletal and neuromuscular problems that affect the temporomandibular joints (TMJ), the muscles of mastication, and related structures. Given this definition, the present study aims to investigate the prevalence of TMD and anxiety disorders among students enrolled in the FAMINAS BH dentistry course, and to correlate these two phenomena to determine whether there is a relationship with course progression. To achieve this objective, a questionnaire was conducted in conjunction with the extraoral examination in groups of students from the initial, intermediate, and final periods to verify the existence of a relationship between psychological and physical conditions related to TMJ. It is concluded that this study reveals a significant association between psychological conditions and TMD in dentistry students. Anxiety and depression are prevalent and are associated with muscular TMD. Furthermore, course progression contributes to an increase in the prevalence of TMD, especially in the final stages.

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Keywords: Temporomandibular Dysfunction. Anxiety. Epidemiological Survey. Dentistry Academics.

RESUMO
De acordo com a Academia Americana de Dor Orofacial (AAOP), as disfunções temporomandibulares (DTM) compreendem um conjunto de problemas musculoesqueléticos e neuromusculares que afetam as articulações temporomandibulares (ATM), os músculos da mastigação e estruturas relacionadas. Visto tal definição o presente estudo objetiva investigar a prevalência da DTM e sintomas do transtorno de ansiedade entre os estudantes matriculados no curso de odontologia da FAMINAS BH, e correlacionar esses dois fenômenos para determinar se há uma relação com a progressão no curso. Para atingir esse objetivo foi realizado um questionário em consonância ao exame extraoral seguindo os critérios do DC/TMD em grupos de alunos dos períodos iniciais, intermediários e finais para verificar a existência da relação entre as condições psicológicas e físicas relacionadas à ATM. Conclui-se que este estudo revela uma associação significativa entre condições psicológicas e DTM em estudantes de Odontologia. Ansiedade e depressão são prevalentes, e estão associadas à DTM muscular. Ademais, a progressão do curso contribui para um aumento na prevalência da DTM, especialmente nos estágios finais.

Palavras-chave: Síndrome da Disfunção da Articulação Temporomandibular. Ansiedade. Estudantes de Odontologia. Aplicações da Epidemiologia.

RESUMEN
Según la American Academy of Orofacial Pain (AAOP), los trastornos temporomandibulares (TTM) comprenden un conjunto de alteraciones musculoesqueléticas y neuromusculares que afectan a las articulaciones temporomandibulares (ATM), los músculos de la masticación y las estructuras relacionadas. A partir de esta definición, el presente estudio tiene como objetivo investigar la prevalencia de los TTM y de los trastornos de ansiedad en estudiantes matriculados en el curso de Odontología de la FAMINAS BH, así como correlacionar estos dos fenómenos para determinar si existe una relación con la progresión del curso. Para alcanzar este objetivo, se aplicó un cuestionario junto con un examen extraoral a grupos de estudiantes de los períodos inicial, intermedio y final, con el fin de verificar la existencia de una relación entre las condiciones psicológicas y físicas relacionadas con la ATM. Se concluye que este estudio revela una asociación significativa entre las condiciones psicológicas y los TTM en estudiantes de odontología. La ansiedad y la depresión son prevalentes y se asocian principalmente con los TTM de origen muscular. Además, la progresión del curso contribuye a un aumento en la prevalencia de TTM, especialmente en las etapas finales.

Palabras clave: Trastorno Temporomandibular. Ansiedad. Estudio Epidemiológico. Estudiantes de Odontología.

1 INTRODUCTION

Stress is part of the physiological nature of the human being and is associated with the individual's adaptive capacity in the face of an important event or situation. However, when it becomes intense or persistent, exceeding the physical, cognitive and emotional capacity of the individual to deal with stressful situations, it will generate a disorganizing effect on the body, which can lead to a pathological condition. Currently, the theme related to stress and its effects is increasingly present in contemporary society. One of the reasons may be the fact that society submits the individual to several factors that trigger this event, thus requiring an incessant physical, psychic and behavioral adaptation[1].

Anxiety disorder can be defined as a pathological condition that causes the patient to be exaggerated concerned about everyday situations that can become triggers for symptoms that impair social interaction and performance in public[2]. According to the studies by Castillo et al. (2000, v. 22, p. 20-23)[3], it is possible to differentiate normal anxiety from pathological anxiety by assessing whether the anxious reaction is short-term, self-limited and related to the stimulus of the moment or not. Thus, based on this differentiation, a psychological intervention can be proposed aimed at alleviating the symptoms caused by pathological anxiety, leading individuals affected by it to enjoy a better quality of life[4].

Among the comorbidities that may be associated with stress and anxiety is temporomandibular disorder (TMD). TMDs encompass a group of musculoskeletal and neuromuscular conditions that involve the TMJ, masticatory muscles, and all associated tissues, and have been identified as one of the main causes of non-dental pain in the orofacial region[5].

The signs and symptoms associated with TMD can vary in their presentation and commonly involve more than one component of the stomatognathic system. The three main signs and symptoms are pain, limited range of motion, and TMJ sounds. Pain is usually the main complaint and can be intermittent or persistent, usually of moderate intensity[6].

During graduation, university students may develop and/or increase the intensity of bruxism, and tend to acquire parafunctional habits, such as resting the hand on the jaw, bruxism, chewing gum, lip biting, and onychophagia[7].

In a cross-sectional study, carried out among students enrolled in the Dentistry course at the Severino Sombra University, the results showed an association between emotional factors and temporomandibular disorder. Of the total number of individuals evaluated, 42.2% had mild TMD and 18.5% had moderate TMD. Symptoms were present in 69% of individuals with emotional impairment. The habit of clenching or grinding the teeth was present in 41.2% of the students and headaches in 32.9%. Regarding the clinical signs, the most common

were tooth wear in 61.8% and gingival recession in 8.2% of the individuals8.

In view of this scenario, the objective of this study is to investigate the prevalence of TMD and anxiety disorders among students of the dentistry course at FAMINAS BH. In addition, seek to correlate these two phenomena to determine if there is a relationship between progression in the course and worsening of TMD due to anxiety. To answer this, this research was conducted, which is cross-sectional, observational and quantitative, in which students of the Dentistry course of the FAMINAS BH college participated.

2 MATERIAL AND METHODS

2.1 ETHICAL ASPECTS

The project was approved by the Research Ethics Committee of the Faculty of Minas Muriaé (FAMINAS) under opinion number 6,598,128. The participation of all individuals in the research sample was subject to the reading and signing of the Informed Consent Form (ICF). The identity and privacy of each participant was safeguarded.

2.2 STUDY DESIGN, SETTING, AND PARTICIPANTS

This is a cross-sectional, observational and quantitative research, in which students of the Dentistry course at Faculdade FAMINAS BH participated. The sample that composed this study are students from the initial, intermediate and advanced periods of the course, covering the first, second, fifth, sixth, ninth and tenth periods, while the other periods were excluded from the analysis. The sample size was calculated individually for each class, considering the number of students enrolled in each period, with a confidence level of 90% and a margin of error of 5%, totaling 117 students.

Data collection was conducted using a standardized assessment form (APPENDIX 2), which included participants' personal information, past and current medical history, along with the application of the "Diagnostic Criteria for Temporomandibular Disorders" (DC/TMD) tool, aimed at identifying the presence or absence of temporomandibular disorders. In addition, the PHQ-9 and GAD-7 questionnaires, also belonging to the DC/TMD, were applied, which served to assess the presence of symptoms of depression and anxiety, respectively. The physical examination partially followed the protocol of the CD/TMD questionnaire, including only palpation of the temporomandibular joint (TMJ) and the masseter and temporalis muscles.

The physical examination was performed by a single evaluator, who underwent calibration with a TMD specialist following the DC/TMD criteria. The anamnesis and the PHQ-9 and GAD-7 questionnaires were administered by two other evaluators. In addition, the

application of the free and informed consent form, followed by the questionnaire, took place at the school clinic of Faculdade FAMINAS BH, at previously defined times and different from class hours.

2.3 STATISTICAL ANALYSIS

After data collection, the results were tabulated in the Excel spreadsheet and were analyzed in a descriptive and analytical way, using frequencies, percentages and association analysis using Pearson's chi-square test and chi-square linear trend test. For data analysis, version 20 of the Statistical Package for the Social Sciences (SPSS) was used. This was done to evaluate the profile of the students in relation to the presence of temporomandibular disorders and to investigate whether there was any association with progression in the Dentistry course.

3 RESULTS

This section details the results obtained from the research, aiming to answer the proposed questions and achieve the established objectives. The collected data were analyzed in a descriptive and analytical way, using frequencies, percentages and association analyses using Pearson's chi-square test and chi-square test of linear trend. For data analysis, version 20 of the Statistical Package for the Social Sciences (SPSS) was used.

The final sample was composed of 117 students of the Dentistry course, selected based on a sample calculation proportional to the number of students in each period. Table 1 presents the characterization data of the sample studied.

Participants were grouped into the initial (first and second periods with 14.5% and 12.8%, respectively), intermediate (fifth and sixth periods with 29.9% and 13.7%, respectively) and final (ninth period with 17.1% and tenth with 12%).

The age group of the participants was categorized by the mean age of the students, divided into two groups where 65.8% were up to 23 years old, while 34.2% were over 23 years old. Regarding gender distribution, most of the sample was composed of females (75.2%) (Table 1).

In addition, the research identified the following systemic alterations among the participants: 0.9% had cardiovascular and hepatic alterations; 6% had endocrine alterations; 45.3% reported respiratory alterations; 21.4% had a diagnosis of gastrointestinal alterations; and 55.6% had neurological alterations (anxiety and/or depression and/or panic syndrome and/or others).

Regarding anxiety, 38.5% of the students did not have anxiety or had a mild degree of anxiety. Moderate anxiety was observed in 26.5% of the students, while 35% had severe anxiety. Regarding depression, 51.3% of the students did not have depression or had a mild degree of depression, 24.8% had moderate depression, 14.5% moderately severe depression, and 9.4% severe depression, as shown in Table 1.

Table 1

Descriptive data from the sample of students (N=117), Belo Horizonte, Brazil, 2024

Variables	Frequency (%)
Gender	
Women	88 (75,2)
Male	29 (24,8)
Age group	
Up to 23 years old	77 (65,8)
Over 23 years old	40 (34,2)
Period	
First	17 (14,5)
According to	15 (12,8)
Fifth	35 (29,9)
Sixth	16 (13,7)
Ninth	20 (17,1)
Tenth	14 (12,0)
Cardiovascular changes	
Absent	116 (99,1)
Gift	1 (0,9)
Endocrine changes	
Absent	110 ((94,0)
Gift	7 (6,0)
Liver disorders	
Absent	116 (99,1)
Gift	1 (0,9)
Respiratory disorders	
Absent	64 (54,7)
Gift	53 (45,3)
Gastrointestinal disorders	
Absent	92 (78,6)
Gift	25 (21,4)
Neurological Changes	
Absent	52 (44,4)
Gift	65 (55,6)
Anxiety*	
Absent or mild	45 (38,5)
Moderate	31 (26,5)
Grave	41 (35,0)
Depression**	
Absent or mild	60 (51,3)
Moderate	26 (24,8)
Moderately severe	17 (14,5)
Grave	11 (9,4)

Source: The authors.
* Data obtained through the GAD7 Generalized Anxiety Disorder Scale.
** Data obtained from the PHQ-9 questionnaire (Patient Health Questionnaire-9).
Statistical tests: a = Chi-square of linear trend.

Table 2 presents the descriptive data related to signs and symptoms of temporomandibular disorder revealed that 47% of the participants reported general pain, while 51.3% had already had headache. Regarding joint noises, 29.1% of the students experienced this symptom. In addition, 13.7% reported having already experienced locking in the jaw closing movement, and 5.1% in the opening movement.

Regarding specific pain, the lateral pole of the temporomandibular joint was affected in 15.4% of the cases, and in the region around the lateral pole in 21.4%. Regarding muscle pain, 23.9% of the participants felt pain in the temporalis muscle, and 31.6% in the masseter muscle (Table 2).

Table 2

Descriptive data related to TMD signs and symptoms in dental students at Faminas-BH (N=117), Belo Horizonte, Brazil, 2024.

Variables	Frequency (%)
General pain	
Absent	62 (53,0)
Gift	55 (47,0)
Headache	
Absent	57 (48,7)
Gift	60 (51,3)
Joint noises	
Absent	83 (70,9)
Gift	34 (29,1)
Locking on closing motion	
Absent	101 (86,3)
Gift	16 (13,7)
Locking on opening motion	
Absent	111 ((94,9)
Gift	6 (5,1)
Pain in the lateral pole of the TMJ	
Absent	99 (84,6)
Gift	18 (15,4)
Pain around the lateral pole TMJ	
Absent	91 (78,6)
Gift	25 (21,4)
Pain in the temporalis muscle	
Absent	89 (76,1)
Gift	28 (23,9)
Pain in the masseter muscle	
Absent	80 (68,4)
Gift	37 (31,6)

Source: The authors.

Table 3 presents the bivariate analyses with the association tests between the exposure variables and the outcome (anxiety level) in dental students. Data with a value of p < 0.05 were considered statistically significant, and important associations were observed

between factors related to graduation, TMD and anxiety level. Within the population studied, the highest prevalence of severe anxiety (47.5%) was observed in the population over 23 years of age. A similar finding was observed in individuals with neurological alterations.

Table 3

Association between exposure variables and outcome (anxiety) in students of the Dentistry course at FAMINAS BH (N=117), Belo Horizonte, Brazil, 2024.

Variables	Anxiety level*			
	Absent or mild	Moderate	Grave	P
Sex [to]	n (%)	n (%)	n (%)	
Male	13 (44,8)	5 (17,2)	11 (37,9)	0,80
Women	32 (36,4)	26 (29,5)	30 (34,1)	
Age group [A]				
Up to 23 years old	35 (45,5)	20 (26)	22 (28,6)	0,01
Over 23 years old	10 (25)	11 (27,5)	19 (47,5)	
Period [to]				
Initial	12 (37,5)	9 (28,1)	11 (34,4)	
Intermediate	23 (45,1)	13 (25,5)	15 (29,4)	0,38
Final	10 (29,4)	9 (26,5)	15 (44,1)	
Gastrointestinal disorders				
Absent	36 (39,1)	27 (29,3)	29 (31,5)	0,31
Gift	9 (36)	4 (16)	12 (48)	
Neurological changes				
Absent	30 (57,7)	12 (23,1)	10 (19,2)	0,00
Gift	15 (23,1)	19 (29,2)	31 (47,7)	
Respiratory disorders				
Absent	28 (43,8)	17 (26,6)	19 (29,7)	0,14
Gift	17 (32,1)	14 (26,4)	22 (41,5)	
Hepatic disorders				
Absent	45 (38,8)	31 (26,7)	40 (34,6)	0,22
Gift	0 (0)	0 (0)	1 (100)	
Endocrine changes				
Absent	43 (39,1)	30 (14,3)	37 (33,6)	0,31
Gift	2 (28,6)	1 (14,3)	4 (57,1)	
Cardiac changes				
Absent	44 (37,9)	31 (26,7)	41 (35,3)	0,26
Gift	1 (100)	0 (0)	0 (0)	
Depression** [a]				
Absent or mild	39 (65)	15 (25)	6 (10)	
Moderate	5 (17,2)	10 (34,5)	14 (48,3)	0,00
Moderately severe	1 (5,9)	4 (23,5)	12 (70,6)	
Grave	0 (0)	2 (18,2)	9 (81,8)	

Source: The authors.
* Data obtained through the GAD7 Generalized Anxiety Disorder Scale.
** Data obtained from the PHQ-9 questionnaire (Patient Health Questionnaire-9).
Statistical tests: a = Chi-square of linear trend.

Table 4

Association between exposure variables and outcome (anxiety) in students of the Dentistry course at FAMINAS BH (N=117), Belo Horizonte, Brazil, 2024

Variables	Anxiety level*			
	Absent or mild	Moderate	Grave	P
General pain [to]				
Absent	31 (50)	16 (25,8)	15 (24,2)	0,00
Gift	14 (25,5)	15 (27,3)	26 (47,3)	
Headache [to]				
Absent	30 (52,6)	16 (28,1)	11 (19,3)	0,00
Gift	15 (25)	15 (25)	30 (50)	
Joint noises				
Absent	36 (43,4)	20 (24,1)	27 (32,5)	0,14
Gift	9 (26,5)	11 (32,4)	14 (41,2)	
Locking in the closing motion [a]				
Absent	41 (40,6)	28 (27,7)	32 (31,7)	0,08
Gift	4 (25)	3 (18,8)	9 (56,2)	
Locking in the opening motion [to]				
Absent	43 (38,7)	31 (27,9)	37 (33,3)	0,28
Gift	2 (33,3)	0 (0)	4 (66,7)	
Pain in the lateral pole of TMJ [to]				
Absent	41 (41,4)	27 (27,3)	31 (31,3)	0,04
Gift	4 (22,2)	4 (22,2)	10 (55,6)	
Pain around the lateral pole of the TMJ				
Absent	38 (41,3)	26 (28,3)	28 (30,4)	0,07
Gift	7 (28)	5 (20)	13 (52)	
Pain in the temporal [muscle a]				
Absent	39 (43,8)	26 (29,2)	24 (27)	0,00
Gift	6 (21,4)	5 (17,9)	17 (60,7)	
Pain in the masseter [to muscle]				
Absent	37 (46,2)	23 (28,8)	20 (25)	0,00
Gift	8 (21,6)	8 (21,6)	21 (56,8)	

Source: The authors.
* Data obtained through the GAD7 Generalized Anxiety Disorder Scale.
** Data obtained from the PHQ-9 questionnaire (Patient Health Questionnaire-9).
Statistical tests: a = Chi-square of linear trend

Although the relationship between the study period and anxiety did not show statistical significance, a high prevalence of severe anxiety was observed in students in the final periods of the course (44.1%) followed by the initial periods (34.4%).

Regarding depression, 81.8% of students with severe depression also suffered from severe anxiety. General and headache pain were significantly associated with severe depression, with 47.3% and 50% of individuals affected, respectively. TMJ pain was reported by 55.6% of participants with severe anxiety. Pain in the temporalis and masseter muscles was associated with severe anxiety in 60.7% and 56.8%, respectively (P = 0.0).

Table 4 of joint TMD shows a higher prevalence of this condition at the end of the course, affecting 29.4% of the participants. In addition, 47.1% of individuals with moderately severe depression and 18.2% with severe depression also have joint TMD. However, no statistical significance was found in the relationship between joint TMD and anxiety, although

39% of the interviewees had this condition. Other findings include a prevalence of 29.5% in females and 17.2% in males. The age group shows that 23.4% of individuals up to 23 years of age have this TMD against 32.5% over 23 years of age. Finally, neurological alterations are present in 32.2% of individuals with joint TMD.

On the other hand, muscle TMD was statistically relevant with the progression of the course, affecting 58.8% of the students in the final periods and 21.9% in the initial ones. In the context of depression, it was observed that 58.8% of the patients with moderately severe depression and 54.5% with severe depression also had this type of TMD. In addition, 61% of respondents suffered from both muscle TMD and severe anxiety. Other findings include a prevalence of 42% in females and 27.6% in males.

The age group indicates that 32.5% of individuals up to 23 years of age have this TMD against 50% over 23 years of age. Finally, neurological alterations are present in 74.2% of individuals with muscular TMD. Finally, it is possible to associate the two TMDs, since the table illustrates that 74.2% of patients with joint TMD also have muscle TMD.

Table 5

Association between joint TMD and muscular TMD with progression of academic training, depression and anxiety in students of the Dentistry course at FAMINAS BH (N=117), Belo Horizonte, Brazil, 2024.

Variable	Joint TMD		
	Absent	**Gift**	
Course progression [to]			
Home	25 (78,1)	7 (21,9)	
Medium	37 (72,5)	14 (27,5)	0,49
End	24 (70,6)	10 (29,4)	
Depression			
Absent or Mild	45 (75)	15 (25)	
Moderate	23 (79,3)	6 (20,7)	
Moderately severe	9 (52,9)	8 (47,1)	0,59
Grave	9 (81,8)	2 (18,2)	
Anxiety			
Absent or mild	35 (77,8)	10 (22,2)	
Moderate	26 (83,9)	5 (16,1)	0,59
Grave	25 (61)	16 (39)	
Sex [b]			
Male	24 (82,8)	5 (17,2)	
Women	62 (70,5)	26 (29,5)	0,19
Age group [b]			
Up to 23 years old	59 (76,6)	18 (23,4)	
Over 23 years old	27 (67,5)	13 (32,5)	0,28
Neurological changes [b]			
Absent	42 (80,8)	10 (19,2)	
Gift	44 (67,7)	21 (32,3)	0,11
Variable	Muscular TMD		
	Absent	**Gift**	

Course progression [to]			
Home	25 (78,1)	7 (21,9)	
Medium	33 (64,7)	18 (35,3)	**0,00**
End	14 (41,2)	20 (58,8)	

Source: The authors.

Table 6

Association between joint TMD and muscular TMD with progression of academic training, depression, and anxiety in students of the Dentistry course at FAMINAS BH (N=117), Belo Horizonte, Brazil, 2024

Variable	Muscular TMD		
	Absent	**Gift**	
Depression			
Absent or Mild	44 (73,3)	16 (26,7)	
Moderate	16 (55,2)	13 (44,8)	
Moderately severe	7 (41,2)	10 (58,8)	**0,00**
Grave	5 (45,5)	6 (54,5)	
Anxiety			
Absent or mild	34 (75,6)	11 (24,4)	
Moderate	22 (71)	9 (29)	**0,00**
Grave	16 (39)	25 (61)	
Sex [b]			
Male	21 (72,4)	8 (27,6)	0,16
Women	51 (58)	37 (42)	
Age group [b]			
Up to 23 years old	52 (67,5)	25 (32,5)	0,06
Over 23 years old	20 (50)	20 (50)	
Neurological changes [b]			
Absent	38 (73,1)	14 (26,9)	**0,02**
Gift	34 (52,3)	31 (47,7)	
Joint TMD [b]			
Absent	64 (74,4)	22 (25,6)	**0,00**
Gift	8 (25,8)	23 (74,2)	

Source: The authors.
Statistical tests: a = Chi-square of linear trend / b = Pearson's chi-square.

4 DISCUSSION

Understanding TMD has always been a complex challenge, due to the lack of consensus and considerable controversy over nomenclature and classification system, in addition to the absence of well-established diagnostic criteria for many years[9].

In 1992, the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) was created, based on the biopsychosocial model of pain, which includes a physical diagnosis (Axis I) and a psychosocial assessment (Axis II)[9]. In 2014, the RDC/TMD was revised, resulting in the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD), which, like the RDC/TMD, also consists of the physical and psychosocial axis. In addition, it is considered a reliable and validated instrument to identify the most common types of TMD, being suitable for both clinical use and research[10]. In the present study, this was the evaluation instrument used.

Based on axis II of the DC/TMD, it was observed that, in relation to anxiety, 38.5% of the students reported absent or mild anxiety, 26.5% moderate and 35% severe. Regarding depression, 51.3% had no or mild depression, 24.8% moderate, 14.5% moderately severe, and 9.4% severe. The emotional state is one of the main triggers of muscle tension, contributing to the development of musculoskeletal disorders. Several studies corroborate the present study and the association between anxiety and depression with the development of TMD11,12,13.

Anxiety is often associated as a comorbidity to TMJ disorders, as it can influence pain perception and release neurotransmitters that contribute to parafunctional habits. In addition, anxiety can intensify TMJ-related hyperactivity of the masticatory muscles, resulting in joint overload13. In line with this finding, TMJ pain was reported by 55.6% of participants with severe anxiety. Pain in the temporalis and masseter muscles was associated with severe anxiety in 7% and 56.8% of cases, respectively.

It was observed that the highest percentage of individuals with severe anxiety was in the final periods (44.1%), followed by the initial periods (34.4%). Anxiety in the early periods can be attributed to the abrupt transition from high school to university, where students face challenges such as new responsibilities, work overload, financial problems, excessive academic demands, social pressures, and lack of time14,15. In the final periods, high anxiety can be justified by the study by Sousa et al. (2016) [12], which highlights that the academic life of students, especially those in the last semesters of their undergraduate studies, tends to be more overloaded due to increasing responsibilities, which makes them more susceptible to intense emotional reactions.

In addition, for Dentistry students, experiences such as the first clinical care for patients, the fear of making mistakes in the face of the challenges of the profession, the fear of the unknown and the need to demonstrate their theoretical skills in practice can significantly raise anxiety levels. However, it is worth noting that the literature shows that not all people who suffer from anxiety have TMD16,17.

This study focused on the analysis of the masseter and temporalis muscles, given the importance indicated by the literature in bilaterally investigating these structures in relation to the painful manifestation associated with TMD. Overall, with regard to muscle pain, 23.9% of the participants felt pain in the temporalis muscle, and 31.6% in the masseter muscle. In fact, it has been observed in the literature that the masseter muscle presents outstanding sensitivity in cases of TMD, possibly due to functional overload of the joint and muscle hyperactivity, although with limited evidence support18.

In this study, the prevalence of muscle TMD was observed in 42% of the female participants and 27.6% of the male participants. In agreement with this data, classic studies such as those by Marinho, Cruz and Leite (2009)[19] Torres et al., (2012)[20] Campos et al. (2014)[21]; and also found a predominance of TMD in women. This may be related to physiological differences of gender, such as: hormonal variations, muscle structure and lower pain threshold, but further investigations on the subject are still needed22.

This predominance highlights the importance of a more detailed follow-up in the prevention of TMD in all phases of a woman's life, especially during periods of change, whether internal or external to the individual. It is necessary to take into account the greater number of women in universities compared to men. This is due to the growing space that women have been gaining in society and in the labor market, so there is a greater demand for their qualification, obtained through entry into higher education23.

On the other hand, research indicates that the higher prevalence observed in females does not mean that they should be prioritized, but serves as a warning for their greater susceptibility to the development of problems in the TMJs and muscles of the stomatognathic system24.

Regarding the age group, the study indicates that 32.5% of individuals up to 23 years of age have muscle TMD, against 50% over the age of 23. Several findings show that TMD has its highest prevalence between 20 and 45 years of age25,26,27. This is justified by the numerous physical, emotional and hormonal changes characteristic of this age group, as well as the professional demands imposed, such as academic training and insertion in the labor market22.

In the analysis of the factors related to the research, it is crucial to highlight that muscle TMD was statistically relevant with the progression of the course, affecting 58.8% of the students in the final periods and 21.9% in the initial periods. This relationship is corroborated by a study conducted by Godinho et al. (2018) [28], which examined university students from the Speech-Language Pathology and Audiology, Physical Therapy, and Biomedicine courses in the initial and final periods, concluding that there is a significant association between the degree of TMD and the final period of the course. This phenomenon is attributed to several factors, including the transition from basic to clinical subjects in the curriculum, greater contact with patients, greater demands from professors, concern with the labor market, and participation in the course completion work28.

On the other hand, it is important to highlight that this research has limitations, mainly due to the fact that part of the instrument used is based on self-diagnosis, which can generate inaccurate notes. These limitations indicate the need for future studies to use more accurate

diagnostic methods to confirm and deepen the understanding of the relationship between academic stress and muscle TMD in university students.

5 FINAL CONSIDERATIONS

In summary, this study with dental students revealed a significant association between systemic and psychological conditions and TMD. Data analysis showed that anxiety and depression are prevalent among students, with a substantial portion experiencing severe cases of these conditions. In addition, neurological changes such as depression and anxiety have been commonly reported.

TMD, both in its joint and muscular forms, was frequent, especially in the final periods of the course. A significant association was observed between muscle TMD and severe cases of anxiety and depression. General and headache pain were also strongly associated with severe depression, while pain in the temporomandibular joint and in the temporalis and masseter muscles was related to elevated levels of anxiety.

The results indicate that there is an increase in the prevalence of TMD as progression in the Dentistry course is associated with an increase in the prevalence of TMD, especially in the final periods. The relationship between mental health and TMD manifestations highlights the need for comprehensive preventive and therapeutic strategies to address these comorbidities. It is concluded that an integrated approach is essential to improve the quality of life of dental students, considering both psychological and physical aspects.
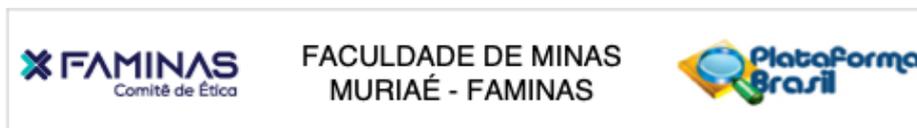
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ANNEXES

APPENDIX I. Opinion issued by the Research Ethics Committee.

FAMINAS
Comitê de Ética

FACULDADE DE MINAS MURIAÉ - FAMINAS

Plataforma Brasil

PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Correlação entre a disfunção temporomandibular e ansiedade em estudantes do curso de odontologia: Estudo epidemiológico

Pesquisador: Simone Angélica de Faria Amormino

Área Temática:

Versão: 2

CAAE: 76100623.8.0000.5105

Instituição Proponente: LAEL VARELLA EDUCACAO E CULTURA LTDA

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 6.643.136

Apresentação do Projeto:

O estresse faz parte da natureza fisiológica do ser humano e está associado à capacidade adaptativa do indivíduo frente a um evento ou situação importante. Entretanto, quando o estresse se torna intenso ou persistente, ultrapassando a capacidade física, cognitiva e emocional do indivíduo em lidar com as situações estressoras, irá gerar um efeito desorganizador no organismo, podendo levar a um quadro patológico

Dentre as patologias que podem ser originadas do estresse está a síndrome da disfunção da articulação temporomandibular (DTM)1.

A American Academy of Orofacial Pain (AAOP) define disfunção temporomandibular (DTM) como um conjunto de condições dolorosas e/ou disfuncionais relacionados aos músculos da mastigação, às articulações temporomandibulares (ATMs) e estruturas associadas2
.

Os sinais e sintomas associados à DTM podem variar em sua apresentação e comumente envolvem mais de um componente do sistema estomatognático. Os três principais sinais e sintomas são dor, amplitude de movimento limitada e sons na ATM. A dor é geralmente a queixa principal e pode ser intermitente ou persistente, geralmente de intensidade moderada. Os sintomas mais comuns são dor e sensibilidade à palpação dos músculos pericranianos e da ATM, e muitas vezes eles coexistem3
.

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Página 01 de 05

Source: The authors

ANNEX II. Diagnostic Criteria for Temporomandibular Disorders Questionnaire

EVALUATION SHEET

PERSONAL IDENTIFICATION

Full Name:

Date of birth

Age:

RG or CPF number

Gender

Address:

Neighborhood:

City:

UF:

Phone:

Email:

HEALTH HISTORY

Do you have or have you ever had any cardiovascular problems?

( ) Hypertension

( ) Stroke

( ) Stroke

( ) Others

Do you have or have you ever had an endocrine disorder?

( ) Diabetes

( ) Thyroid (hypothyroidism or hyperthyroidism)

( ) Others:

Do you have or have you ever had a liver problem?

( ) Cirrhosis

( ) Hepatitis

( ) Others

Do you have or have you ever had any respiratory problems?

( ) Pneumonia

( ) Rhinitis

( ) Asthma

( ) Others:

Do you have or have you ever had any gastrointestinal problems?

( ) Gastritis

( ) Ulcer

( ) Others:

Do you have or have you ever had any neurological problems?

( ) Anxiety

( ) Depression

( ) Panic Syndrome

( ) Others:

Have you noticed symptoms of anxiety or depression before or after starting your college journey?

Do you believe that college and your advancement in the course contributed to intensifying your symptoms of anxiety or depression?

Do you have or have you ever had any allergy problems?

( ) Medicinal product

( ) Food

( ) Others:

Do you have any sexually transmitted diseases?

( ) Syphilis

( ) Tuberculosis

( ) HIV

( ) Others:

How is your health in general?

Have you had any medical treatment in the last 6 months?

Have you had any surgery recently?

Have you been hospitalized recently?

Pregnancy:

Lactating:

Do you use any medication? If so, which one?

Source: Authorship

QUESTIONNAIRE TO ASSESS THE PRESENCE OF SYMPTOMS OF DEPRESSION (PHQ-9)

In the last 2 weeks, how often have you been bothered by the following issues? Please put a check mark on the box to indicate your answer.

	No way	Many days	More than half the days	Almost every day
	0	1	2	3
1. Little interest or enjoyment in doing things	( )	( )	( )	( )
2. Feeling down, depressed, or hopeless	( )	( )	( )	( )
3. Difficulty falling asleep or staying asleep, or sleeping too much	( )	( )	( )	( )
4. Feeling tired or low on energy	( )	( )	( )	( )
5. Lack of appetite or overeating	( )	( )	( )	( )
6. Feeling bad about yourself – or that you're a failure or that you've let yourself or your family down	( )	( )	( )	( )
7. Difficulty concentrating on one thing, such as reading the newspaper or watching television	( )	( )	( )	( )
8. Moving or speaking so slowly that other people might notice? Or the opposite – being so restless that you've been moving around a lot more than usual	( )	( )	( )	( )
9. Thinking it would be better to die or hurt yourself in some way	( )	( )	( )	( )

Total Score:

If you have marked any issues, how difficult have those issues made it difficult for you to do your job, take care of things around the house, or get along with other people?

It's not difficult at all	A little difficult	Very difficult	Extremely difficult
( )	( )	( )	( )

Source: Ohrbach R, editor. Diagnostic Criteria for Temporomandibular Disorders: Assessment Instruments. Version 15May2016. [Diagnostic Criteria for Temporomandibular Disorders: Clinical Protocol and Assessment Instruments: Brazilian Portuguese Version 25May2016] , Trans. www.rdc-tmdinternational.org Accessed on 25 Feb 2024.

QUESTIONNAIRE TO ASSESS THE PRESENCE OF ANXIETY SYMPTOMS
(GAD-7)

In the last 2 weeks, how often have you been bothered by the following issues? Place a check mark in the box to indicate your answer.

	No way	Many days	More than half the days	Almost every day
	0	1	2	3
1. Feeling nervous or anxious	( )	( )	( )	( )
2. Not being able to stop or control worries	( )	( )	( )	( )
3. Worrying too much about different things	( )	( )	( )	( )
4. Difficulty relaxing	( )	( )	( )	( )
5. Being so restless that it's hard to sit still	( )	( )	( )	( )
6. Being easily irritated	( )	( )	( )	( )
7. Felt afraid, as if something terrible could happen	( )	( )	( )	( )

Total Score:

If you have marked any issues, how difficult have those issues made it difficult for you to do your job, take care of things around the house, or get along with other people?

It's not difficult at all	A little difficult	Very difficult	Extremely difficult
( )	( )	( )	( )

Source: Ohrbach R, editor. Diagnostic Criteria for Temporomandibular Disorders: Assessment Instruments. Version 15May2016. [Diagnostic Criteria for Temporomandibular Disorders: Clinical Protocol and Assessment Instruments: Brazilian Portuguese Version 25May2016] , Trans. www.rdc-tmdinternational.org Accessed on 25 Feb 2024.

DIAGNOSTIC CRITERIA FOR TEMPOROMANDIBULAR DISORDERS (CD/TMD)

PAIN

1. Have you ever felt pain in the jaw (mouth), temple, ear, or front of the ear on either side?

( ) No

( ) Yes

If you answered NO, skip to Question 5.

2. How many years or months ago did you first feel pain in the jaw (mouth), temple, ear, or front of the ear?

_____ Years _____ Months

3. In the past 30 days, which of the following answers best describes any pain you have had in your jaw, temple, ear, or front of ear on either side?

( ) No pain

( ) Pain comes and goes

( ) Pain is always present

If you answered No Pain, skip to Question 5

4. In the past 30 days, have any of the following activities changed any pain (i.e., improved or worsened the pain) in your jaw, temple, ear, or front of ear on either side?

	No	Yes
A. Chewing hard or sturdy foods	( )	( )
B. Opening the mouth or moving the jaw forward or to the side	( )	( )
C. Habits or quirks with the jaw (mouth), such as holding teeth together, clenching or grinding teeth, or chewing gum	( )	( )
D. Other activities with the jaw (mouth) such as talking, kissing, yawning	( )	( )

HEADACHE

5. In the last 30 days, have you had any headaches that included the temple areas of your head?

( ) No

( ) Yes

If you answered NO to Question 5, skip to Question 8.

6. How many years or months ago did your temple headache first start?

_____ Years _____ Months

7. In the last 30 days, have the following activities changed your headache (i.e., improved or worsened the pain) in the temple region on either side?

	No	Yes
A. Chewing hard or sturdy foods	( )	( )
B. Opening the mouth or moving the jaw forward or to the side	( )	( )
C. Habits or quirks with the jaw (mouth), such as holding teeth together, clenching or grinding teeth, or chewing gum	( )	( )
D. Other activities with the jaw (mouth) such as talking, kissing, yawning	( )	( )

JOINT NOISES

8. In the last 30 days, have you heard any sound or noise in the joint when you moved or used your jaw (mouth)?

( ) No

( ) Yes

Researcher's Use:

( ) D

( ) E

( ) Don't know

CLOSED JAW LOCKING

9. Have you ever jammed or hesitated, even for a moment, so that you couldn't open it ALL THE WAY?

( ) No

( ) Yes

Researcher's Use:

( ) D

( ) E

( ) Don't know

If you answered NO to Question 9, skip to Question 13.

10. Has your jaw (mouth) locked or hesitated enough to limit its opening and interfere with your ability to eat?

( ) No

( ) Yes

Researcher's Use:

( ) D

( ) E

( ) Don't know

11. In the last 30 days, your jaw (mouth) has locked in such a way that you have not been able to open ALL THE WAY THROUGH, even for a moment only, and then it has unlocked and you have been able to open IT ALL THE WAY?

( ) No

( ) Yes

Researcher's Use:

( ) D

( ) E

( ) Don't know

If you answered NO to Question 11, skip to Question 13

12. At this moment your jaw (mouth) is locked or with little opening so that you cannot open ALL THE WAY?

( ) No

( ) Yes

Researcher's Use:

( ) D

( ) E

( ) Don't know

JAW OPEN LOCKING

13. In the last 30 days, when you have opened your mouth wide enough, has it frozen or hesitated even for a moment, so that you have not been able to close it from this position of wide opening?

( ) No

( ) Yes

Researcher's Use:

( ) D

( ) E

( ) Don't know

If you answered NO to Question 13, then you are done

14. In the last 30 days, when your jaw (mouth) locked or hesitated in this position of wide opening, did you need to do anything to close it, such as relaxing, moving, pushing or making some movement (maneuver) with your mouth?

( ) No

( ) Yes

Researcher's Use:

( ) D

( ) E

( ) Don't know

DC/TMD EXAMINATION FORM MUSCLE PAIN AND TMJ

TMJ Assessment

RIGHT SIDE		LEFT SIDE	
ATM	PAIN	ATM	PAIN
Side pole (0.5 kg)	(N) (S)	Side pole (0.5 kg)	(N) (S)
Around the side pole (1kg)	(N) (S)	Around the side pole (1kg)	(N) (S)

Temporal muscle assessment

RIGHT SIDE

(1kg)	Pain	Family pain	Familial headache	Referred pain
Temporal – Posterior	(N) (S)	(N) (S)	(N) (S)	(N) (S)
Temporal – Medium	(N) (S)	(N) (S)	(N) (S)	(N) (S)
Temporal - Previous	(N) (S)	(N) (S)	(N) (S)	(N) (S)

LEFT SIDE

(1kg)	Pain	Family pain	Familial headache	Referred pain
Temporal – Posterior	(N) (S)	(N) (S)	(N) (S)	(N) (S)
Temporal – Medium	(N) (S)	(N) (S)	(N) (S)	(N) (S)
Temporal - Previous	(N) (S)	(N) (S)	(N) (S)	(N) (S)

Temporal muscle assessment

RIGHT SIDE

(1kg)	Pain	Family pain	Familial headache	Referred pain
Masseter - Origin	(N) (S)	(N) (S)	(N) (S)	(N) (S)

	Pain		Family pain		Familial headache		Referred pain	
Masseter – Body	(N)	(S)	(N)	(S)	(N)	(S)	(N)	(S)
Masseter – Insertion	(N)	(S)	(N)	(S)	(N)	(S)	(N)	(S)

LEFT SIDE

(1kg)	Pain		Family pain		Familial headache		Referred pain	
Masseter - Origin	(N)	(S)	(N)	(S)	(N)	(S)	(N)	(S)
Masseter – Body	(N)	(S)	(N)	(S)	(N)	(S)	(N)	(S)
Masseter – Insertion	(N)	(S)	(N)	(S)	(N)	(S)	(N)	(S)

Source: Ohrbach R, editor. Diagnostic Criteria for Temporomandibular Disorders: Assessment Instruments. Version 15May2016. [Diagnostic Criteria for Temporomandibular Disorders: Clinical Protocol and Assessment Instruments: Brazilian Portuguese Version 25May2016], Trans. www.rdc-tmdinternational.org Accessed on 25 Feb 2024.