

Correlation between temporomandibular dysfunction symptoms, deleterious oral habits and symptoms of stress in university students

Correlação entre sintomas de disfunção temporomandibular, hábitos orais deletérios e sintomas de estresse em estudantes universitários

Correlación entre síntomas de disfunción temporomandibular, hábitos orales deletéreos y síntomas de estrés en estudiantes universitarios

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Abstract

Purpose: To investigate temporomandibular dysfunction symptoms, presence of deleterious oral habits and stress in college students of Speech-Language and Hearing Sciences, Physiotherapy and Biomedicine undergraduate courses from the first and last years of a University Center; compare

This study was presented as simple summary at the 11^o Brazilian Meeting of Orofacial Motricity, 2018, Porto Alegre and at the 3rd Speech-Language and Hearing Sciences Congress of the Faculdade de Medicina UFMG, 2018, Belo Horizonte.

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Authors' Contributions:

DCAG and SRM: study design, collection and analysis of data and writing of the manuscript; MESL and RMMM: study design and supervision of the study.

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Received: 18/11/2018

Accepted: 18/09/2019

the results of the first period and the final period of each course; and verify the correlation between deleterious oral habits, age, sex, temporomandibular dysfunction symptoms and stress symptoms. **Methods:** Questionnaires were administered to a sample composed by 83 undergraduate students. We used Fonseca's Anamnestic Index to evaluate temporomandibular dysfunction symptoms; a list with deleterious oral habits; and, to evaluate the stress, Lipp's Inventory of Symptoms of Stress for Adults. Data were analyzed with significance level of 5%. **Results:** There was a high prevalence of symptoms of temporomandibular dysfunction in the sample, most of which were mild. There was association with statistical significance between having symptoms of temporomandibular dysfunction and the final year of the courses, supporting object under the chin, lip biting and stress. There was association between the degree of temporomandibular dysfunction and the final year of the courses, the habits of clenching or grinding of the teeth, leaning of the head on the arm, cheek biting and the number of habits performed. The stress diagnosis was correlated with the undergraduate course year. **Conclusion:** Data suggest a positive correlation between the presence of symptoms of temporomandibular dysfunction, deleterious oral habits and stress in undergraduate students of the last years of health care courses.

Keywords: Temporomandibular Joint Disorders; Habits; Stress, Psychological; Students.

Resumo

Objetivo: investigar os sintomas de disfunção temporomandibular, presença de hábitos orais deletérios e estresse em universitários dos cursos de Fonoaudiologia, Fisioterapia e Biomedicina dos períodos iniciais e finais de um Centro Universitário; comparar os resultados do período inicial em relação ao período final de cada curso; e verificar a correlação entre hábitos orais deletérios, idade, sexo, sintomas de disfunção temporomandibular e sintomas de estresse. **Métodos:** Questionários foram aplicados a uma amostra composta por 83 acadêmicos. Foram utilizados o Índice Anamnésico de Fonseca para investigação dos sintomas de disfunção temporomandibular; uma lista com hábitos orais deletérios; e, para avaliar o estresse, o Inventário de Sintomas de Stress para Adultos de Lipp. Os dados foram analisados com nível de significância de 5%. **Resultados:** Encontrou-se alta prevalência de sintomas de disfunção temporomandibular na amostra, sendo a maioria de grau leve. Houve associação com significância estatística entre apresentar sintomas de disfunção temporomandibular e os períodos finais dos cursos, apoiar objeto sob o queixo, morder os lábios e estresse. Houve associação do grau da disfunção temporomandibular com os períodos finais dos cursos, com os hábitos de ranger ou apertar os dentes, colocar a mão no queixo e morder a bochecha e com o número de hábitos praticados. O diagnóstico de estresse apresentou correlação com o período do curso. **Conclusão:** Os dados sugerem correlação positiva entre presença de sintomas de disfunção temporomandibular, hábitos orais deletérios e estresse em estudantes dos últimos períodos dos cursos da área de saúde.

Palavras-chave: Transtornos da articulação temporomandibular; Hábitos; Estresse psicológico; Estudantes; Articulação temporomandibular.

Resumen

Objetivo: Investigar los síntomas de disfunción temporomandibular, presencia de hábitos orales deletéreos y estrés en universitarios de los cursos de Fonoaudiología, Fisioterapia y Biomedicina de los períodos iniciales y finales de un Centro Universitario; comparar los hallazgos del período inicial con el período final de cada curso; y verificar la correlación entre hábitos orales nocivos, edad, sexo, síntomas de disfunción temporomandibular y síntomas de estrés. **Métodos:** Los cuestionarios fueron aplicados a una muestra compuesta por 83 académicos. Se utilizó el Índice Anamnésico de Fonseca para la investigación de los síntomas de disfunción temporomandibular; una lista con hábitos orales deletéreos; y para evaluar el estrés, el inventario de síntomas de estrés para adultos de Lipp. Los datos fueron analizados con un nivel de significancia del 5%. **Resultados:** Se encontró una alta prevalencia de síntomas de disfunción temporomandibular en la muestra, siendo la mayoría de grado leve. Se observó asociación con significancia estadística entre presentar síntomas de disfunción temporomandibular y los períodos finales de los cursos, apoyar el objeto bajo la barbilla, morder los labios y el estrés. Se

ha asociado el grado de disfunción temporomandibular con los períodos finales de los cursos, con los hábitos de ranger o apretar los dientes, colocar la mano en la barbilla y morder la mejilla y el número de hábitos practicados. El diagnóstico de estrés presentó correlación con el período del curso. **Conclusión:** Los datos sugieren correlación positiva entre presencia de síntomas de disfunción temporomandibular, hábitos orales deletéreos y estrés en estudiantes de los últimos períodos de los cursos del área de salud.

Palabras clave: Trastornos de la articulación temporomandibular; Hábitos; Estrés psicológico; Estudiantes; Articulación temporomandibular.

Introduction

The temporomandibular joint (TMJ) comprises a set of structures that enable the movement of the mandible, namely: mandibular fossa, articular disk and mandibular condyle. This is among one of the most complex and requested articulations of the human body. With its intricate movements of rotation and translation and together with the masticatory muscles, it allows humans to perform functions on which the survival depends^{1,2}.

Temporomandibular dysfunction (TMD) is characterized by impairment of the mandibular movements and pains in the orofacial region. It appears when these structures are unbalanced¹. It manifests through signs and symptoms as limitation and deviations in the jaw movements, chewing difficulties and hearing sensations, such as tinnitus, pains and/or pressure in the ear. Facial pains, headaches and joint noises are also common. The stomatognathic system is highly adaptable, and small changes in this structure may cause inadequate changes that will affect functions that mainly involve chewing and articulation of the speech².

The TMD etiology is associated with neuromuscular changes, tooth malocclusion, psychological factors and traumas². Several studies point out that this is a multifactorial dysfunction, that is, it can be initiated by several of these factors, not having only one cause yet^{3,4}.

Among the psychological factors, stress, which can be defined as an organism reaction to situations identified as threatening ones to its physical and emotional well-being⁵. It has been widely discussed in the literature as one of the main contributing causes for the maintenance of a TMD condition^{6,7}. The busy life of the modern society implies an increase in stress levels, which, consequently, may reflect in the increase of the muscular activity of the individual, causing inadequate contractions. Surveys with young people and college students reveal a high incidence of stress in those popula-

tions due to the demands and adaptations needed during the academic period⁸⁻¹².

The presence of deleterious oral habits such as teeth clenching, to bite objects, nail biting, nocturnal bruxism and lip biting are also often associated with TMJ changes and often work as an outlet for the muscle tension².

Researching the scientific databases, several studies performed by health professionals on the prevalence of TMD in college students were found. Students in healthcare courses are often exposed to situations of tension and psychological stress due to the intense theoretical content, practical classes and specific situations of clinical care of patients, as well as the anxiety about the professional future. Therefore, they constitute a population at risk for the development of these symptoms¹³⁻¹⁷.

Most individuals with some degree of TMD are not being treated because, although it is a recurrent dysfunction, it is little addressed and investigated in the clinical routine. Thus, it is only identified when the individual seeks help, and most often this happens when the situation is at a more advanced level. Therefore, late diagnoses and incorrect treatments result in increased stress of the individual due to the persistence or worsening of the symptoms⁶.

The investigation of the prevalence of TMD in the academic population is important to encourage the development of TMD prevention actions in the target population and broaden the discussion in the scientific community on the theme, mainly in the speech-language pathology and audiology area, which still has few studies on the subject. It is believed that the emotional tension resulting from the academic tasks and demands that surround undergraduate students favors the emergence of deleterious oral habits and temporomandibular dysfunction due to the increase of muscle activity in this region. Therefore, the present study aimed to: investigate the temporomandibular dysfunction symptoms, the presence of deleterious oral habits and stress in university students of Speech-

Language and Hearing Sciences, Physiotherapy and Biomedicine of the initial and final periods of a University Center; compare the results of the initial periods with the final periods ones of each course; and to verify the correlation between deleterious oral habits, age, gender, temporomandibular dysfunction symptoms and stress symptoms.

Material and methods

This research refers to a quantitative observational cross-sectional study conducted after approval by the Research Ethics Committee (CAEE: 70325917.5.0000.5096).

The sample was obtained by convenience and involved 84 students (from a universe of 150 enrolled in the night shift of the studied periods) of the Speech-Language and Hearing Sciences, Physiotherapy and Biomedicine courses of a University Center, present in the first and last periods, because it was believed that comparing these two periods of the courses, due to the large amount of academic demands in the final graduation periods, there would be an increase in stress levels.

The researchers informed the students about the objectives and stages of the study and invited them participate in the research. All clarifications were made in clear and accessible language. Those who agreed and signed the Informed Consent Form answered questionnaires for the investigation of the presence of TMD symptoms and/or deleterious oral habits and for the identification of stress.

In order to investigate the TMD symptoms, Fonseca Anamnestic Index⁽¹⁹⁾ was used, a validated questionnaire used in surveys of this category^{13,15}, which demonstrated excellent reliability and high accuracy for the diagnosis of TMD of muscular origin²⁰. For each of the questions on the questionnaire, there is a possibility of three answers (yes, no and sometimes) which have a pre-established score of 10, 0 and 5, respectively. The presence of TMD symptoms was considered for cases with a score equal to or higher than 20⁽¹⁹⁾. With the sum of the points, the TMD grade was classified as absent (0 to 15 points), mild (20 to 45 points), moderate (50 to 65 points) or severe (70 to 100 points)¹⁹. To investigate deleterious oral habits, it was used the list of habits created by Medeiros et al.¹⁵.

To estimate the presence of stress signs, the Lipp's Stress Symptoms Inventory for Adults⁵ was used, which allows a clear diagnosis of the

existence of stress symptoms, as well as the current stage of it (alert, resistance, almost exhaustion and exhaustion) and the predominant symptomatology, whether physical or psychological. This questionnaire was chosen because it has a recognized validity in studies and clinical works in the area of stress and is easy and quick to apply^{10,11}.

The questionnaires were inserted in a sheet of paper with header to be filled in with personal data such as: name, age, gender and period of the course. These data were important for the referral of those who needed treatment.

The inclusion criteria were: to be enrolled in the initial or final periods of the Speech-Language and Hearing Sciences, Physiotherapy or Biomedicine courses, being considered initial periods the first and second ones and final periods the last and second to last ones of each course; and to sign the Informed Consent Form. One (1) questionnaire was excluded from the survey because it presented incomplete data.

The chi-square test, the Fisher's exact test and the chi-square test of multiple comparisons were applied to assess the association between categorical variables: presence of TMD symptoms, grade, stress, deleterious oral habits, gender, course and attended period. In cases where there was an association between the outcome variable (presence of TMD symptoms, TMD grade and stress) and the risk variable (deleterious oral habits, gender, period and course), the odds ratio (OR) was calculated with the confidence interval (CI).

In order to test the distribution of the continuous variables (age and number of habits), the Kolmogorov-Sminorv test was applied. It was applied the Independent Samples t Test or ANOVA with Bonferroni correction to assess the association between the outcomes and the continuous variables. The data were analyzed using the IBM SPSS statistical program with significance level of 5%.

Results

The study included 83 individuals with an average age of 25 years (minimum 18, maximum 52, standard deviation of 7), 65 (78.3%) women and 18 (21.7%) men. Of these individuals, 50 (60.2%) were enrolled in the Speech-Language and Hearing Sciences course, 16 (19.3%) in the Biomedicine one and 17 (20.5%) in the Physiotherapy course. Forty-three students (51.8%) were in the initial



periods and 40 (48.2%) in the final periods of their courses. Absence of TMD was found in 20 individuals (24.1%). Regarding the TMD grade, of the 63 with symptoms, 45 (71.4%) had mild grade, 12 (19.0%) moderate one and six (9.5%), severe grade. Of the reported symptoms, the most prevalent were: nape of the neck or neck pains (33%), joint noises when chewing and/or opening the mouth (30.9%) and frequent headaches (29.7%). Besides, 35% of the individuals consider themselves tense or nervous people.

Regarding the presence of deleterious oral habits, 48 (57.8%) individuals had the habit of putting their hands on the chin; 38 (45.8%) of clenching their teeth and 37 (44.6%) of biting their lips.

The stress diagnosis was positive for 50 (60.2%) individuals. As for the stress stages, 42 (84%) individuals were in the Resistance stage; 3 (6%) in the Almost Exhaustion one and 3 (6%) in the Exhaustion stage. In the research of predominant symptomatology, most individuals (48.2%) presented psychological aspects.

Table 1 shows the association between the presence of symptoms and the TMD grade and the course, period, gender, deleterious oral habits and stress. The results indicate that there was a statistically significant association between the presence of TMD symptoms and the final period of the course. Students of the final periods are 3.75 times more likely to have TMD symptoms than those of the initial periods (OR 3.75; CI 1.214-11.58). The habits of supporting object under the chin and biting the lips also demonstrated statistical significance, as individuals who support objects under the chin are 10.19 times more likely to have TMD

symptoms than those who do not (OR 10.19; CI 1.2-81.32), and individuals who bite their lips are 6.64 more likely (OR 6.64; CI 1.76-24.96) to have TMD symptoms than those who do not have such a habit. The diagnosis of stress was also statistically relevant and showed that individuals with a positive diagnosis of stress are 7.5 times more likely to have TMD symptoms (OR 7.5; CI 2.37-23.69) than the individuals with negative diagnosis of it.

The results also indicate that there was an association between the TMD grade and the presence of deleterious oral habits of grinding the teeth, clenching them, putting the hand on the chin and cheek biting. The proportion of people who clench their teeth is higher among those with moderate (33%) and severe (25%) TMD grades when compared with mild TMD grade (7%). Regarding the teeth clenching habit, this proportion is higher for the moderate and severe TMD grades (83%) than for the mild TMD one (45%). The proportion of people who have the habit of putting the hands on the chin is higher (100%) in the cases of severe TMD than in the mild (56%) and moderate (67%) grades. Concerning the cheek biting habit, it presents a higher proportion for the moderate (50%) and severe (50%) TMD grades, being almost the double when compared to the mild (22%) one.

The age was similar among students with and without TMD symptoms ($p < 0.700$). The number of deleterious oral habits was significantly higher in the group of students with TMD symptoms when compared with the group without TMD ($p < 0.001$). Figure 1 presents the comparative analysis between number of habits and presence and absence of TMD symptoms.

Table 1. Association between presence of symptoms and grade of temporomandibular dysfunction (TMD) and course, period, gender, deleterious oral habits and stress

Variable	PRESENCE OF TMD SYMPTOMS (n=83)		p Value	TMD GRADE (n=63)			p Value	
	No	Yes		Mild	Moderate	Severe		
Course	Speech Pathology	12	38	0.774*	27	7	4	0.705
	Biomedicine	3	13		10	3	0	
	Physiotherapy	5	12		8	2	2	
Period	Initial	15	28	0.016**	21	5	2	0.526
	Final	5	35		24	7	4	
Gender	Women	14	51	0.306**	36	10	5	0.955
	Men	6	12		9	2	1	
Teeth grinding	Absent	18	54	0.627***	42	8	4	0.024
	Present	2	9		3	4	2	
Teeth clenching	Absent	14	31	0.106**	28	2	1	0.005
	Present	6	32		17	10	5	
Nail biting	Absent	16	36	0.067	28	5	3	0.297
	Present	4	27		17	7	3	
Bite objects	Absent	15	35	0.125**	25	7	3	0.899
	Present	5	28		20	5	3	
Chew Gum	Absent	11	37	0.772**	24	7	6	0.565
	Present	9	26		21	5	0	
Cheek biting	Absent	18	44	0.072***	35	6	3	0.046
	Present	2	19		10	6	3	
Support object under the chin	Absent	19	41	0.009***	31	7	3	0.297
	Present	1	22		14	5	3	
Suck the finger	Absent	20	61	0.426***	44	12	5	0.179
	Present	0	2		1	0	1	
Put the hand on the chin	Absent	11	24	0.187**	20	4	0	0.042
	Present	9	39		25	8	6	
Tongue biting	Absent	19	60	0.966***	44	11	5	0.095
	Present	1	3		1	1	1	
Lip biting	Absent	17	29	0.002***	19	7	3	0.458
	Present	3	34		26	5	3	
Chew on one side only	Absent	14	40	0.600**	31	7	2	0.092
	Present	6	23		14	5	4	
Sleep on one side only	Absent	15	38	0.239**	27	9	2	0.568
	Present	5	25		18	3	4	
Other	Absent	20	61	0.426***	44	12	5	0.179
	Present	0	2		1	0	1	
Diagnosis of Stress	Negative	15	18	<0.001**	15	1	2	0.436
	Positive	5	45		30	11	4	
	Alert	0	2		1	1	0	
Stage (n=50)	Resistance	5	37	0.569*	26	9	2	0.695
	Almost	0	3		0	1	2	
	Exhaustion	0	3		3	0	0	
Predominant symptomatology	Psychological	2	38	0.218*	27	9	2	0.072
	Physical	3	3		2	1	0	
	Physical and psychological	0	4		1	1	2	

*Chi-square test for multiple comparisons; **Chi-square test; *** Fisher's exact test; p=significance probability at 5%, OR = Odds Ratio; CI = Confidence Interval (Lower Limit-Upper Limit)

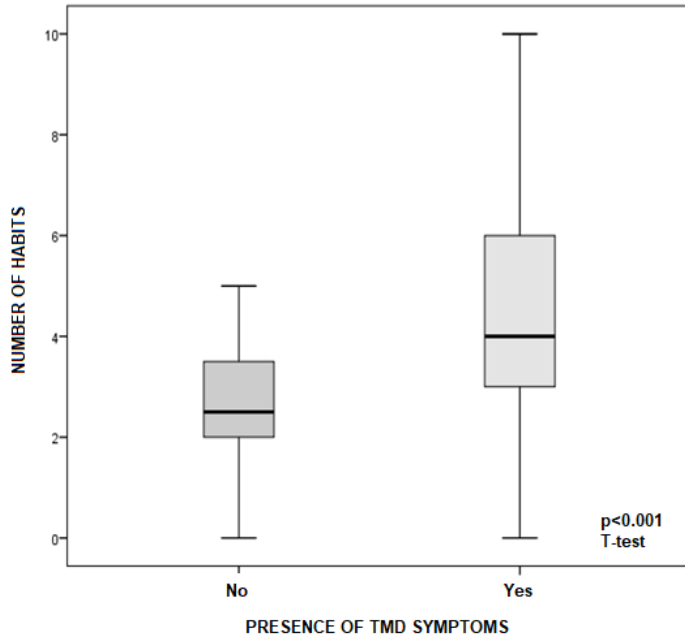


Figure 1. Comparative analysis between number of habits and presence and absence of TMD symptoms.

In figure 2 it is possible to view the relation between the TMD grade and the number of deleterious oral habits. The higher the degree of TMD, the greater the number of habits practiced. Individuals

without TMD have two habits on average while individuals with symptoms of severe TMD present six on average.

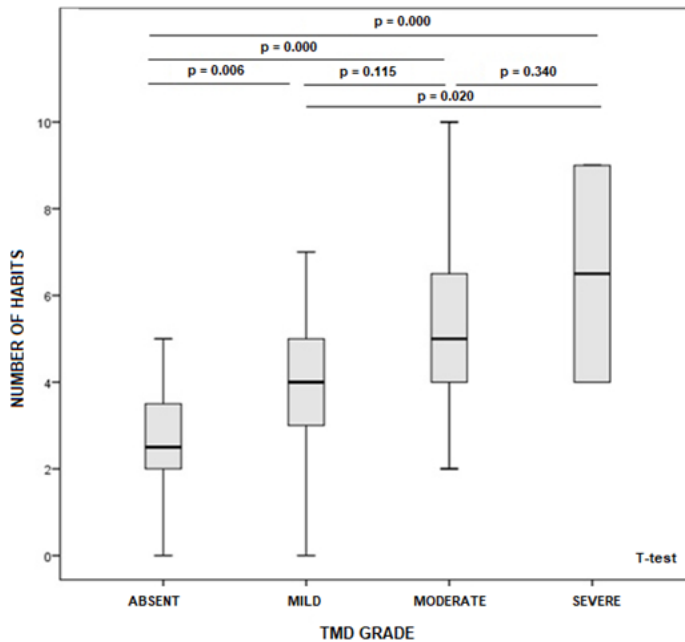


Figure 2. Comparative analysis between TMD grade and number of habits.

Table 2 shows the relationship between diagnosis and stress stage, course, period, gender and deleterious oral habits. Results indicate that course period and gender are associated with stress. Regarding gender, a woman is 2.49 times more likely to have stress than a man (OR 2.49; CI 1.6-5.34). Concerning the period, being in the final period of the course is 4.35 times more likely to have stress

than being in the initial period (OR 4.35; CI 1.67-11.31). The data show that 44% of initial period people and 77% of the final period ones have stress. It was observed that the stress stage was related only to the number of habits. Individuals in the alert stage have a higher number of deleterious oral habits than those in the other stages.

Table 2. Association between diagnosis and stress stage and course, period, gender, deleterious oral habits

		DIAGNOSIS OF STRESS		p Value	STAGE (n=50)				p Value
		Negative	Positive		Alert	Resistance	Almost Exhaustion	Exhaustion	
Course	Speech Pathology	17	33	0.900*	1	29	1	2	0.830**
	Biomedicine	6	10		0	9	0	1	
	Physiotherapy	10	7		1	4	2	0	
Period	Initial	24	19	0.002**	1	17	0	1	0.403**
	Final	9	31		1	25	3	2	
Gender	Women	20	45	0.001***	2	39	2	2	0.060**
	Men	13	5		0	3	1	1	
Teeth grinding	Absent	29	43	0.808***	1	36	3	3	0.160**
	Present	4	7		1	6	0	0	
Teeth clenching	Absent	22	23	0.066**	0	23	0	0	0.111**
	Present	11	27		2	19	3	3	
Nail biting	Absent	23	29	0.287**	1	26	1	1	0.307**
	Present	10	21		1	16	2	2	
Bite objects	Absent	23	27	0.156**	1	24	1	1	0.383**
	Present	10	23		1	18	2	2	
Chew Gum	Absent	20	28	0.682**	1	24	3	0	0.344**
	Present	13	22		1	18	0	3	
Cheek biting	Absent	24	38	0.741**	0	36	1	1	0.182**
	Present	9	12		2	6	2	2	
Support object under the chin	Absent	27	33	0.118***	1	29	2	1	0.403**
	Present	6	17		1	13	1	2	
Suck the finger	Absent	32	49	0.768***	2	41	3	3	0.808
	Present	1	1		0	1	0	0	
Put the hand on the chin	Absent	18	17	0.065**	0	15	1	1	0.750**
	Present	15	33		2	27	2	2	
Tongue biting	Absent	30	49	0.143***	2	42	2	3	0.130**
	Present	3	1		0	0	1	0	
Lip biting	Absent	21	25	0.226**	0	22	2	1	0.808**
	Present	12	25		2	20	1	2	
Chew on one side only	Absent	22	32	0.805**	0	30	0	2	0.685**
	Present	11	18		2	12	3	1	
Sleep on one side only	Absent	22	31	0.670**	0	28	1	2	0.740**
	Present	11	19		2	14	2	1	
Other	Absent	32	49	0.768***	2	41	3	3	0.808**
	Present	1	1		0	1	0	0	
Number of habits		2.65 ± 1.42	4.62 ± 2.33	0.001*	8.50 ± 2.12	4.07 ± 1.89	6.33 ± 2.5	6.67 ± 2.08	0.002*

*Chi-square test for multiple comparisons; **Chi-square test; *** Fisher's exact test; p=significance probability at 5%, OR = Odds Ratio; CI = Confidence Interval (Lower Limit-Upper Limit); *ANOVA test.

Table 3 shows that there was no statistical significance in the relation between predominant symptomatology of the stress and course, gender, period or deleterious oral habits.

Regarding the predominant symptomatology of the stress in relation to age, and number of habits, there was no statistical significance as shown in table 4.

Table 3. Association between predominant symptomatology of the stress and course, period, gender, deleterious oral habits

		PREDOMINANT SYMPTOMATOLOGY			Total	p Value*
		Psychological	Physical	Physical and psychological		
Course	Speech Pathology	23	6	4	33	0.330
	Biomedicine	10	0	0	10	
	Physiotherapy	7	0	0	7	
Period	Initial	17	0	2	19	0.532
	Final	23	6	2	31	
Period speech Pathology	Initial	9	0	2	11	0.734
	Final	14	6	2	22	
Period biomedicine	Initial	5	0	0	5	-
	Final	5	0	0	5	
Period physiotherapy	Initial	3	0	0	3	-
	Final	4	0	0	4	
Gender	Women	35	6	4	45	0.282
	Men	5	0	0	5	
Teeth grinding	Absent	36	3	4	43	0.491
	Present	4	3	0	7	
Teeth clenching	Absent	18	4	1	23	0.840
	Present	22	2	3	27	
Nail biting	Absent	23	4	2	29	0.956
	Present	17	2	2	21	
Bite objects	Absent	22	4	1	27	0.472
	Present	18	2	3	23	
Chew Gum	Absent	23	2	3	28	0.941
	Present	17	4	1	22	
Cheek biting	Absent	30	6	2	38	0.731
	Present	10	0	2	12	
Support object under the chin	Absent	29	4	0	33	0.099
	Presente	11	2	4	17	
Suck the finger	Absent	40	6	3	49	0.053
	Present	0	0	1	1	
Put the hand on the chin	Absent	16	0	1	17	0.178
	Present	24	6	3	33	
Tongue biting	Absent	39	6	4	49	0.646
	Present	1	0	0	1	
Lip biting	Absent	20	2	3	25	0.891
	Present	20	4	1	25	
Chew on one side only	Absent	27	4	1	32	0.153
	Present	13	2	3	18	
Sleep on one side only	Absent	27	3	1	31	0.077
	Present	13	3	3	19	
Other	Absent	39	6	4	49	0.646
	Present	1	0	0	1	

p=significance probability at 5%; *Chi-square test for multiple comparisons.

Table 4. Association between predominant symptomatology of the stress and age and number of habits

	PREDOMINANT SYMPTOMATOLOGY			p Value*
	Psychological	Physical	Physical and psychological	
Age	24.58 ± 6.4	23.33 ± 3.38	21.75 ± 2.63	0.624
Number of Habits	4 ± 2.1	5 ± 1.26	6.5 ± 3	0.133

p=significance probability at 5%; * ANOVA test.

Discussion

In the present study, there was a high prevalence of TMD symptoms in the academic population, most of them mild, which corroborates studies that also used the same research instrument¹³⁻¹⁶, as well as other instruments²¹. Regarding the most reported symptoms, noises (clicks and crackles) in the joints were also prevalent in other studies, which observed a prevalence of 31.9% to 48.5% in the studied population^{13-14,21}.

The relation between the presence of TMD symptoms and the final period of the course was positive in this study, which found a significantly higher number of individuals with TMD symptoms attending the final periods of the researched courses. It is believed that this finding is related to the fact that students in the final periods of the health courses are more involved in internships, clinical care that requires great responsibility and high academic demand compared to the first years of the courses in which basic subjects are approached and there is no workload of internships yet. Increased demand may imply increased tension in the individual and, consequently, increased muscle activity in general, which also includes TMJ.

Analyzing the relation between presence of TMD symptoms, presence of deleterious oral habits and stress diagnosis, it was found statistical significance between the presence of TMD symptoms, stress and the habits of supporting object under the chin and biting the lips. Those with these habits are six to ten times more likely to develop TMD symptoms compared to those without them. Besides, according to the results of this study, a person with TMD symptoms has on average twice the oral habits of those without. TMD is known to have multifactorial etiology and the deleterious oral habits have been considered highly relevant factors for the emergence or progression

of temporomandibular dysfunction, as mentioned by other authors^{22,23}.

Concerning the deleterious oral habits, it was identified a statistical relation between the TMD grade and the habits of teeth grinding (bruxism) and clenching, putting the hand on the chin and cheek biting. Cauás et al.²⁴ also found prevalence of habits (put the hand on the chin: 73.5%; teeth clenching: 59.7% and teeth grinding: 57.6%) in TMD patients, confirming the frequency and strong relation of such habits with temporomandibular dysfunction. In their study, Medeiros et al.¹⁵ researched the prevalence and relation between deleterious oral habits and gender, course, moment of the course, age and emotional tension, finding relation only between habits and emotional tension. However, it is interesting to point out that the most prevalent habits in their study were also the ones of putting the hand on the chin, grinding and clenching the teeth besides sleeping on only one side. A survey with university students found that 31.6% of the sample had bruxism and this habit was associated with stress, muscle pain, pain in the TMJs and joint noise²⁵. Another research¹³ also found prevalence of such habits in 52% of individuals who had some grade of TMD. These oral habits overload the joint surfaces, altering the normal blood flow of the muscle tissues and reducing the lubrication of the joint structure, resulting in symptoms of fatigue, pain and spasm^{1,26}.

It was also identified that the higher the severity of TMD, the greater the number of habits that the individual presents. Authors²⁷ identified in their study a higher prevalence of TMD in individuals who had oral habits than in those who did not. However, no studies were found in the literature that correlated TMD severity with the presence of habits. The age variable was not significantly related to the TMD grade.

As for the diagnosis of stress, similar to the results of this work, a study¹² that also used the Lipp's



Inventory⁵ revealed a percentage of 74% of stressed students, most of them in the Resistance stage. According to Lipp, the resistance stage is characterized by a prolonged period of the positive stage of stress (alert) and the body tries to resist stressors to reestablish the inner balance. Moreover, at this stage the productivity drops dramatically⁵. This is interesting datum for the creation of pedagogical strategies that minimize this risk.

Another important aspect observed was that the final periods of the courses presented a higher number of stressed people than the initial ones. Souza and Menezes²⁸ identified in one research that medical students from the 5th semester presented a higher grade of stress (51.7%) than the students from the 1st semester (21.3%). Similarly, other authors²⁹ found that students of the 4th year of Physiotherapy had a higher level of stress compared to the 1st year ones. The authors linked this result to the fact that in recent years there has been a transition of basic subjects to the clinics in the curriculum, besides greater contact with patients, greater demand from teachers, the concern about the labor market and the participation in the course completion work. No studies were found that carried out this investigation with Speech-Language and Hearing Sciences students.

Regarding gender, the results showed a higher prevalence of stress in women, possibly explained by the fact that women are more susceptible to the diagnosis of stress because they are more spontaneous in admitting the symptoms or difficulties they face than men are^{28,29}.

It was also found that individuals in the Alert stage of the stress have a higher number of habits compared to the Resistance, Almost Exhaustion and Exhaustion stages. However, it is noteworthy that this datum should be analyzed with caution since the number of people in the Alert (n=2), Near Exhaustion (n=3) and Exhaustion (n=3) states was small. The alert stage stress is considered a positive stress that prepares for the action, in which there is greater adrenaline production and motivation⁵. Considering this, we can infer that this stage can generate more compensatory movements, including those unconscious ones, which are the deleterious oral habits, seeking relief from the tension that situations of expectation for the action may generate.

The hypothesis that there is a correlation between deleterious oral habits, stress and TMD symptoms in college students was confirmed. It

can be inferred that the high demand required at the end of undergraduate courses in health care area contributes to the emergence and/or maintenance of these signs and symptoms. It is noteworthy that the courses researched are composed of many students who work during the day and study at night. Such students have a large amount of daily activities under their responsibility and generally have fewer hours of sleep than recommended. The literature points out that the poor sleep quality leads to increased stress, which contributes to the development of TMD.³⁰ For future studies it is suggested to include the investigation of the amount of hours of sleep and of the performance of activities in which the students are paid. A limitation of the study was the imbalance of the sample between women and men, a consequence of the larger number of women in the courses studied. The literature points out that women report more TMD symptoms than men.²¹ Another suggestion would be to address other courses in other areas of knowledge and also courses offered during the day in order to investigate whether there is relation between knowledge area and daily period of the course offer with the other variables surveyed.

Conclusion

High prevalence of TMD symptoms was identified in the target population, most of them mild. There was an association between presence of TMD symptoms and the final period of the course, habits of supporting object under the chin and biting the lips and diagnosis of stress. There was an association between the TMD grade and the final period of the course and the presence of habits of teeth grinding, teeth clenching, putting a hand on the chin and cheek biting. The higher the grade of TMD, the greater the number of habits practiced by the individual. There was an association between course period and gender with the positive diagnosis of stress.

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