

# Temporomandibular disorders and relationship with socio-demographic and clinical variables in a University of the state of Rio de Janeiro

*Disfunções temporomandibulares e a relação com determinantes sócio-demográficos e clínicos em uma universidade do estado do Rio de Janeiro*

Renata Nogueira Barbosa<sup>1</sup>, Fábio Renato Pereira Robles<sup>1</sup>, Andréa Videira Assaf<sup>1</sup>, Marcelo Gomes da Silva<sup>1</sup>, Karine Laura Cortellazzi Mendes<sup>2</sup>, Antônio Sérgio Guimarães<sup>3</sup>

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** This study aimed at identifying the prevalence of suspected temporomandibular disorders in employees and students of a Brazilian university and at evaluating the influence of socio-demographic and clinical variables on this disorder.

**METHODS:** This study had a non-probabilistic sample of 575 volunteers who were evaluated by a questionnaire proposed by the American Academy of Orofacial Pain.

**RESULTS:** Suspected temporomandibular disorder was present in 60.87% of the population. By means of multiple logistic regression analysis, just clinical variables were associated to the presence of suspected temporomandibular disorder, such as: headache, neck pain or teethache (OR=47.60), stiff, tight or regularly tired jaws (OR=13.37), mouth opening difficulty (OR=13.55) and pain around the ears, temples or cheeks (OR=4.61).

**CONCLUSION:** The questionnaire was effective as a pre-screening tool to identify symptoms, and results support the importance of clinical symptoms for the identification and follow up of patients with such disorders.

**Keywords:** Epidemiology, Headache, Neck pain, Temporomandibular joint, Temporomandibular joint disorders.

## RESUMO

**JUSTIFICATIVA E OBJETIVOS:** O objetivo deste estudo foi identificar a prevalência de suspeita de disfunção temporomandibular em funcionários e estudantes em uma universidade no Brasil e analisar a influência das variáveis sócio-demográficas e clínicas sobre essa disfunção.

1. Universidade Federal Fluminense, Instituto de Saúde de Nova Friburgo, Departamento de Formação Específica, Nova Friburgo, RJ, Brasil.

2. Faculdade de Odontologia, Departamento de Saúde Coletiva, São Paulo, SP, Brasil.

3. Universidade Estadual Paulista, Faculdade de Medicina, Departamento de Morfologia e Genética, Universidade Paulista de Medicina. São Paulo, SP, Brasil.

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### Endereço para correspondência:

Rua Dr. Sílvio Henrique Braune, 22 – Centro

28625-650 Nova Friburgo, RJ, Brasil.

E-mail: renatanogueirabarbosa@gmail.com

**MÉTODOS:** Este estudo teve uma amostra não probabilística compreendendo 575 voluntários que foram avaliadas por um questionário, proposto pela Academia Americana de Dor Orofacial.

**RESULTADOS:** A suspeita de disfunção temporomandibular estava presente em 60,87% da população. Por meio da análise de regressão logística múltipla, apenas variáveis clínicas foram associadas com a presença de suspeita de disfunção temporomandibular, como: apresentar cefaleia, dores no pescoço ou nos dentes (OR=47,60), maxilares rígidos, apertados ou cansados com regularidade (OR=13,37), dificuldade na abertura da boca (OR=13,55) e dor ao redor das orelhas, têmporas ou bochecha (OR=4,61).

**CONCLUSÃO:** O questionário foi eficaz como um instrumento de pré-triagem no levantamento dos sintomas; e os resultados suportam o ponto forte dos sintomas clínicos na identificação e acompanhamento de indivíduos com tais lesões.

**Descritores:** Articulação temporomandibular, Cefaleia, Cervicalgia, Epidemiologia, Transtornos da articulação temporomandibular.

## INTRODUCTION

Temporomandibular disorders (TMD) are part of a complex of pathologies that affect the masticatory system in its joints and muscles. Due to its multifactorial origin, many studies have sought to define the mechanisms that prompt or cause this condition. Although the etiology of TMD is unknown, these disorders can be caused by trauma to the face or even by an inflammatory process of the temporomandibular joint (TMJ)<sup>1</sup>.

Epidemiological studies have shown considerable variability in the pattern of this condition<sup>2,3</sup>. There are factors such as age, gender, direct and indirect traumas, oral parafunctions, tooth loss, pathophysiological factors, occlusal disorders, as well as psychosocial and psychological factors that can be associated with TMD<sup>4-9</sup>.

Health professionals have been reported to have high levels of anxiety, which begins in the undergraduate years. Anxiety levels and other stress factors in students have been subject to research, since this has been related to increased risk for the onset of other conditions<sup>10</sup>.

Based on this, various studies have been carried out within universities<sup>11-13</sup> and results generally show that a large percentage of students have some degree of TMD, especially females, individuals who are anxious and those that are in the latter part of their course<sup>12,14-16</sup>.

The literature reveals different tools to measure TMD, organized in various forms: questionnaires, anamnestic indexes, and clinical diagnostic criteria<sup>8</sup>. Each of these tools has its own advantages, di-

sadvantages and limitations, as well as distinct applications. Thus, both the clinician and the researcher must be aware of the type of data that can be obtained from the application of each tool, and how to use it adequately<sup>17</sup>.

Various surveys have been used for initial screening of potential patients with orofacial pain, including TMD<sup>8</sup>. One such survey has been prepared by the American Academy of Orofacial Pain (AAOP)<sup>8</sup>. This questionnaire has ten specific issues related to TMD. However, the author of the questionnaire recommends that such screening should be combined with anamnesis and clinical data<sup>17</sup>. It should be pointed out that such tool is viable for large populations, like a study with epidemiological characteristics.

Early diagnosis of TMD is of extreme importance so that any deterioration can be prevented and/or controlled. Also, with proper diagnosis, treatment strategies can be tailored for each patient.

Thus, the present study aimed at evaluating the prevalence of suspected TMD in employees and students of Nova Friburgo Campus of the Fluminense Federal University of the State of Rio de Janeiro, Brazil, and at analyzing the influence of socio-demographic and clinical variables on the way people experience this condition.

## METHODS

This cross-sectional census survey was carried out by initially counting on the participation of all students (n=658), teachers (n=87), outsourced employees and technical and administrative staff (n=105) of three health courses: Phonoaudiology, Dentistry and Biomedicine at the Nova Friburgo Campus of the Fluminense Federal University, where, because it was a census study, it was proposed to take 100% of the sample. With the losses due to exclusion criteria, there were 850 individuals of both genders, aged 18 to 69 years in 2012. The majority of the individuals at the University are from the inland mountainous region of the state of Rio de Janeiro. Volunteers could refuse to participate or withdraw from the study at any time, without this implying any type of penalty or damage to their care.

The Free and Informed Consent Form was signed by volunteers in order to participate in the study, and they were duly informed that all identities would remain undisclosed.

A pilot study was carried out before the main study with teachers (n=5), employees (n=5) and students (n=5) linked to the Nova Friburgo Campus of UFF, in order to check the understanding of the questions in the questionnaires to be applied as well as to train the researchers in the organization, and how to approach and carry out the main research phase.

In this second stage, the semi-structured questionnaires, previously tested in a pilot study, were presented to participants in the classroom, together with the Free and Informed Consent form, and also to other participants in their work places. Prior to handing out the questionnaires, the researcher explained the objectives of the study and restated the confidentiality of the replies to avoid any influence among participants concerning the information provided. The questionnaires and Informed Consent forms were collected immediately after being filled out. The semi-structured questionnaire used here was the questionnaire for pre-screening of orofacial pain and temporomandibular disorders recommended by the AAOP<sup>8</sup>. The

questionnaire is composed of 10 self-explanatory questions of clinical nature, with yes/no answers to the most common signs and symptoms of orofacial pain and TMD<sup>9</sup>. Information on suspected TMD, was combined with socio-demographic characteristic data of participants (Attachment 1).

The questionnaire was reapplied in 10% of the study population, after a minimum interval of one week, in order to determine the reproducibility/consistency of answers.

At first a descriptive analysis of the data was carried out to grasp an initial understanding of data acquired and characterization of the population. For bivariate and multivariate analyses, suspected TMD was considered as dependent variable (dichotomized into 'yes' and 'no'). Independent variables were categorized as follows: gender (male, female), age (<30, ≥ 30 years old), race (leucoderm, melanoderm, feoderm and xanthoderm), occupation (student, teacher, technical/administrative, outsourced), education (high school - maximum, graduation - minimum), course (not a student, biomedical, speech pathology and dentistry), study period (not a student, up to the third period - basic cycle, as of the fourth period professional-cycle), mouth opening difficulty (no, yes), closed lock jaw (no, yes), difficulty in using the jaw (no, yes), presence of TMJ noise (no, yes), stiff, tight or frequently tired jaws (no, yes), pain around the ears, temples or cheek (no, yes), TMD signs and symptoms (muscle, joint, joint and muscle), headaches, neck pains or toothaches (no, yes), co-morbidities commonly associated with TMD (headaches, toothaches, neck, no pain, more than one pain), recent trauma to the head, neck, or jaw (no, yes), recent change in bite (no, yes), treatment for a problem not explained in TMJ (no, yes).

This study was approved by the Ethics Committee of the Fluminense Federal University (UFF), following Resolution 196/96 of the National Health Council, Ministry of Health, under process: CEP/CMM/HUAP n.12395 - CAAE n.00895412.0 .0000.5243.

## Statistical analysis

The association of independent and dependent variables underwent Chi-square or Fisher's Exact test and 5% significance level was applied. Variables that were statistically significant at 20% level or less in the bivariate analysis were selected for multiple logistic regression analysis using the stepwise procedure. Odds ratio (OR) and respective 95% confidence intervals (CI) were estimated for variables that remained in the multiple regression model at 5% level. All statistical tests were performed using SAS software (SAS User's Guide: Statistics, version 9.2 Cary [NY]: SAS Institute Inc in 2001).

## RESULTS

Response rate was 67.65% (n=575) of 850 individuals at the UFF. Factors related to this drop of participants were: refusal to participate in the research, incomplete or inadequate filling out of the Free and Informed Consent form and absence or difficulty in locating the individual to hand over and collect the questionnaires.

However, despite of this loss of individuals (n=275; 32.35%), information obtained from the course coordination department showed that these subjects had similar socio-demographic characteristics to those who participated in the survey.

The reproducibility of the answers, from the questionnaires reapplied to 57 individuals (10% of the total evaluated), gave a satisfactory result, with agreement values of 87%.

Sample included students (84.69%), teachers (8.69%), technical/administrative personnel (4.34%) and outsourced personnel (3.65%). Out of this total 24.69% were males and 75.13% were females, mean population age was 24.7 years (>30 years (16%) <30 years (84%)).

Based on analyzed information, there was higher proportion of positive responses among female subjects and students (from the latter periods of the Dentistry course, and those who were not living with their families).

Characteristics related to the movement of mouth opening and closing as well as limitations and difficulties (questions 1 and 2) represented 15.36% and fatigue and difficulties in chewing, (questions 3 and 5) represented 22.09% in the studied group. These results suggest the need for further research into teeth clenching.

Joint noises noticed by subjects (clicks, crackle, friction and hypermobility) (question 4) represented 35.47% of affirmative answers.

A prevalence of 34% positive answers for co-morbidities associated with neck pains, headaches or toothaches was identified, which should be given closer attention due to the high frequency of these positive answers (19.03%).

Regarding the bivariate analysis, variables age, race, occupation, education, course, period and TMD signs and symptoms had no significant association with suspected TMD (Table 1).

Multiple logistic regression analysis showed that risk factors associated with the presence of suspected TMD were: headaches, neck pains or toothaches (OR=47.60), stiff, tight or frequently tired jaws (OR=13.37), mouth opening difficulty (OR=13.55) and pain and tenderness around the ears, temples or cheeks (OR=4.61) (Table 2).

**Table 1.** Bivariate analysis by Chi-square test or Fisher's Exact test for association between dependent variable (suspected TMD) and independent variables (socio-demographic variables). Nova Friburgo, Rio de Janeiro, Brazil, 2013

Variables	Suspected TMD				OR	CI95%	p value
	No		Yes				
	n	%	n	%			
<b>Gender</b>							
Female	155	35.88	277	64.12	ref		
Male	71	50.00	71	50.00	0.56	0.38-0.82	0.0028
<b>Age (years)</b>							
<30	183	38.28	295	61.72	ref		
>=30	42	45.65	50	54.35	0.74	0.47-1.16	0.1855
<b>Race</b>							
Leucoderm	176	39.29	272	60.71	ref		
Melanoderm	12	60.00	8	40.00	0.43	0.17-1.08	0.1062
Feoderm	24	35.29	44	64.71	1.19	0.70-2.02	0.6199
Xanthoderm	2	50.00	2	50.00	0.65	0.09-4.64	0.9384
<b>Occupation</b>							
Student	185	38.70	293	61.30	ref		
Teacher	19	38.00	31	62.00	1.03	0.57-1.88	0.9557
Technical/administrative personnel	11	44.00	14	56.00	0.80	0.36-1.81	0.7497
Outsource personnel	11	52.38	10	47.62	0.57	0.24-1.38	0.3040
<b>Education</b>							
Incomplete higher	196	39.60	299	60.40	Ref		
Complete higher	30	37.97	49	62.03	1.07	0.66-1.75	0.7842
<b>Course</b>							
Not a student	41	43.16	54	56.84	ref		
Dentistry	134	36.02	238	63.98	1.35	0.85-2.13	0.2445
Speech pathology	22	43.14	29	56.86	1.00	0.50-1.99	0.8628
Biomedicine	29	51.79	27	48.21	0.71	0.36-1.37	0.3909
<b>Period</b>							
Not a student	40	42.55	54	57.45	ref		
Up to 3 <sup>rd</sup> period (basic)	92	45.10	112	54.90	0.90	0.55-1.48	0.7753

OR = odds ratio; CI = confidence interval; 'Yes' category is the reference level of dependent variable (suspected TMD); Not possible to calculate OR as the frequency was equal to zero.

**Table 2.** Bivariate analysis by Chi-square test or Fisher's Exact test for association between dependent variable (suspected TMD) and independent variables (clinical variables). Nova Friburgo, Rio de Janeiro, Brazil, 2013

Variables	Suspected TMD				OR	CI 95%	P Value
	No		Yes				
	n	%	n	%			
Difficult in mouth opening							
No	225	44.29	283	55.71	ref		
Yes	1	1.52	65	68.48	51.68	7.12-375.32	<0.0001
Closed lock							
No	226	43.46	294	56.54	-		
Yes	0	0.00	54	100.00	-	-	-
Difficulty using the jaws							
No	225	43.44	293	56.56	ref		
Yes	1	1.79	55	98.21	42.23	5.80-307.53	<0.0001
Presence of noise in the TMJ							
No	224	60.38	147	39.62	ref		
Yes	2	0.99	201	99.01	153.14	37.46-626.16	<0.0001
Stiff, tight or regularly tired jaws							
No	223	47.85	243	52.15	ref		
Yes	3	2.78	105	97.22	32.12	10.05-102.66	<0.0001
Pain around the ears, temples or cheek							
No	222	46.84	252	53.16	ref		
Yes	4	4.00	96	96.00	21.14	7.65-58.42	<0.0001
Location of one pain							
Muscular type	3	4.48	64	95.52	-		
Articular type	1	5.00	19	95.00	-	-	-
Articular and muscular	0	0.00	9	100.00	-	-	-
Headaches, neck pains or toothaches							
No	222	57.96	161	42.04	ref		
Yes	4	2.09	187	97.91	64.46	23.46-177.16	<0.0001
Location of two pains							
Headaches	2	1.83	107	98.17	ref		
Teeth	0	0.00	20	100.00	-	-	-
Neck	0	0.00	29	100.00	-	-	-
No pains	222	58.12	160	41.88	0.01	0.00-0.06	<0.0001
More than one pain	2	5.88	32	94.12	0.30	0.04-2.21	0.5131
Recent history of trauma to the head, neck, or jaws							
No	226	40.36	334	59.64	-		
Yes	0	0.00	14	100.00	-	-	-
Recent change in bite							
No	225	43.27	295	56.73	ref		
Yes	1	1.85	53	98.15	40.42	5.55-294.53	<0.0001
Treatment for problem not explained by TMJ							
No	226	40.87	327	59.13	-		
Yes	0	0.00	21	100.00	-	-	-

OR = odds ratio; CI = confidence interval; A 'Yes' category is the reference level of dependent variable (suspected TMD). Not possible to calculate OR as the frequency was equal to zero; TMJ = temporomandibular joint.

**Table 3.** Multiple logistic regression analysis. Nova Friburgo. RJ. Brasil. 2013

Variables	Suspected TMD		OR	CI95%	p value
	n	%			
Headache, neck pains or toothaches					
No	161	42.04	Ref		
Yes	187	97.91	47.60	17.06-132.79	<0.0001
Stiff, tight or frequently tired jaws					
No	243	52.15	Ref		
Yes	105	97.22	13.37	3.90-45.81	<0.0001
Mouth opening difficulty					
No	283	55.71	ref		
Yes	65	68.48	13.55	1.65-111.11	<0.0001
Pain around the ears, temples or cheeks					
No	252	53.16	ref		
Yes	96	96.00	4.61	1.42-15.02	0.0009
Difficulty using the jaws					
No	293	56.56	ref		
Yes	55	98.21	7.27	0.82-64.34	0.0452

A 'Yes' category is the reference level of dependent variable (suspected TMD); OR = odds ratio; CI = confidence interval.

## DISCUSSION

Previous epidemiological studies have shown prevalence of TMD between 40% and 75%<sup>1,6,16,19-21</sup> when using pre-structured questionnaires in different populations<sup>8</sup>, which corroborates the results of this study that reported prevalence of suspected temporomandibular dysfunction of 60.87%.

This result in itself would suggest, depending on the tool used, a more specific study and systematic classification.

Temporomandibular disorder may be related to parafunctional habits, muscle pain, joint noises and other comorbidities that should be investigated as from the suspected diagnosis.

Parafunctional habits such as teeth clenching may overload masticatory muscles and TMJ, and could therefore affect the entire chewing system<sup>17</sup> in agreement with results found in this study. Those who answered "yes" to questions 3 and 5 (difficulty using the jaws and stiff, tight or frequently tired jaws), 97.22 and 68.48%, respectively, are more likely to develop the condition.

Joint noises noticed by the subjects (clicks, crackle, friction and hypermobility) (question 4) represented 35.47% of the answers. However, a high occurrence of these noises in different studies is well known<sup>24,25</sup> and this is not necessarily characterized as TMD or the need for professional attention or intervention.

It is important to identify co-morbidities such as headaches and neck pains, as well as other non TMDs pains in the orofacial region, due to their pathophysiological relationship with trigeminal nerve nuclei, which perpetuate morbid TMD characteristics, such as peripheral and central sensitizations, and decrease tolerance thresholds for these inter-related injuries<sup>26</sup>. The prevalence of 19.13% (OR=47.60), which was found for headaches, requires more detailed attention.

Individual psychological and interpersonal factors as well as situational variables can influence the adaptive capacity of a patient, which

leads to hypotheses that some emotional conditions such as anxiety, depression and individual personality traits are characteristics that may predispose, initiate and perpetuate TMD<sup>27,28</sup>.

It is also worth noting that dentistry students have a greater awareness of issues related to dental occlusion and suspected TMD, which generates a possible overestimation of positive responses for this class of individuals. Thus, they should receive further clarification and professional guidance. Also a deeper and more personal investigation of these individuals is recommended.

Thus, the results presented in this study point out the need for a systematic investigation and classification by a tool comprising these factors, such as the Research Diagnostic Criteria for Temporomandibular Disorders - RDC/TMD<sup>22</sup> or Diagnostic criteria for temporomandibular disorders DC/TMD<sup>23</sup> in future studies. Results presented here are also in agreement with other authors<sup>6</sup>, stating that the questionnaire proposed by the AAOP is feasible and viable as a pre-screening tool in patients with temporomandibular disorders and may even be used by general practitioners in their offices. However it should be emphasized that this questionnaire is not the only tool for diagnosis, and should be used as an auxiliary tool to track individuals with suspected TMD and subsequent referral to specialists for Temporomandibular Disorders.

## CONCLUSION

This study was able to identify important aspects of temporomandibular disorders at the Nova Friburgo Campus suggesting that a deeper systematic investigation and classification in 60.87% of the population studied should be held. Clinical variables presented a significant correlation with suspected TMD, which shows the importance of clinical symptoms in identifying and tracking individuals with such an injury.



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**Attachment 1.** Questionnaire adapted for orofacial pain and temporomandibular disorders recommended by the American Academy of Orofacial Pain (AAOP)

Name:.....  
 Date.../.../.....  
 Address:.....  
 Who do you live with? ( ) Friends ( ) Family ( ) Others  
 Gender: ( ) F ( ) M Age: years Date of Birth.../.../.....  
 Race.....  
 Occupation:.....  
 Education:.....  
 Sector:.....Course:.....  
 Period:.....  
 E-mail:.....

1. Do you have difficulties, pain or both when opening your mouth, for example when yawning?  
 ( ) yes ( ) no

2. Has you jaw become stiff, closed locked or dislocated?  
 ( ) yes ( ) no

3. Do you have difficulty, pain or both when you chew, speak or use your jaws?  
 ( ) yes ( ) no

4. Do you notice noises in your jaw joints?  
 ( ) yes ( ) no

5. Do your jaws feel stiff, tight or are frequently tired?  
 ( ) yes ( ) no

6. Do you have pain in or around your ears, temples or cheeks?  
 ( ) yes ( ) no

7. Do you have headaches, neck pains or toothaches frequently?  
 ( ) yes ( ) no

62 Where: a ( ) head; b ( ) neck; c ( ) teeth?

8. Have you suffered any recent head, neck or jaw trauma?  
 ( ) yes ( ) no

9. Have you noticed any recent change to your bite?  
 ( ) yes ( ) no

10. Have you had any recent treatment for a problem not explained by a TMJ disorder?  
 ( ) yes ( ) no

Do you use any dental device.....

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