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

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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.

MÉTODOS: Este estudo teve uma amostra não probabilística compreendendo 575 voluntários que foram avaliados 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).³

Epidemiological studies have shown considerable variability in the pattern of this condition⁵. 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 TMD⁴-⁹.

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 conditions¹⁰. Based on this, various studies have been carried out within universities¹¹-¹³ 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 course¹²,¹⁴-¹⁶.

The literature reveals different tools to measure TMD, organized in various forms: questionnaires, anamnestic indexes, and clinical diagnostic criteria⁸. Each of these tools has its own advantages, di-
advantages 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. Various surveys have been used for initial screening of potential patients with orofacial pain, including TMD. One such survey has been prepared by the American Academy of Orofacial Pain (AAOP). 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. 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. 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. 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, foederm 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), TMJ 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 tiring 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       | %     |         |         |
| Gender                                              |              |         |          |         |
| Female                                              | 155      | 35.88 | 277      | 64.12  | ref     |         |
| Male                                                | 71       | 50.00 | 71       | 50.00  | 0.56    | 0.38-0.82 | 0.0028 |
| Age (years)                                         |              |         |          |         |
| <30                                                  | 183      | 38.28 | 295      | 61.72  | ref     |         |
| >=30                                                 | 42       | 45.65 | 50       | 54.35  | 0.74    | 0.47-1.16 | 0.1855 |
| Race                                                |              |         |          |         |
| 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 |
| Occupation                                          |              |         |          |         |
| 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 |
| Education                                           |              |         |          |         |
| 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 |
| Course                                              |              |         |          |         |
| 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 |
| Period                                              |              |         |          |         |
| Not a student                                       | 40       | 42.55 | 54       | 57.45  | ref     |         |
| Up to 3rd 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 |          |          |          | P Value |
|------------------------------------------------|---------------|----------|----------|----------|---------|
|                                               | No            | Yes      | OR       | CI 95%   |         |
| Difficult in mouth opening                     |               |          |          |          |         |
| No                                            | 225 (44.29%)  | 283 (55.71%) | ref     |          |         |
| Yes                                           | 1 (1.52%)     | 65 (11.20%) | 51.68   | 7.12-375.32 | <0.0001 |
| Closed lock                                    |               |          |          |          |         |
| No                                            | 226 (43.46%)  | 294 (56.54%) | -      |          |         |
| Yes                                           | 0 (0.00%)     | 54 (10.00%) | 100.00 | -        |         |
| Difficulty using the jaws                      |               |          |          |          |         |
| No                                            | 225 (43.44%)  | 293 (56.56%) | ref     |          |         |
| Yes                                           | 1 (1.79%)     | 55 (10.90%) | 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 (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 (1.83%)     | 32 (98.17%) | 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 (1.83%)     | 53 (98.17%) | 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.
DISCUSSION

Previous epidemiological studies have shown prevalence of TMD between 40% and 75% when using pre-structured questionnaires in different populations, 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 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 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. 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.

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 or Diagnostic criteria for temporomandibular disorders DC/TMD in future studies. Results presented here are also in agreement with other authors, 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.

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 | 252 | 53.16| ref          |         |
| 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.
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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 your 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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