

Environmental stress and temporomandibular disorder (TMD) among members of a public university in Brazil

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Abstract

Temporomandibular disorder (TMD) is one of several somatic manifestations of stress. Several studies have shown that some patients with TMD suffer more anxiety than individuals without this condition. The aim of this study was to identify individuals with TMD and correlate with environmental stress among members of a public university. A proportional stratified probabilistic procedure was used to select 455 subject's age 17-63 yrs consisted of students, staff and professors. The subjects were enlisted after lunch. TMD were diagnosed using a screening questionnaire based on the American Academy of Orofacial Pain (AAOP). Presence of TMD was defined based on pain in chewing or speaking, tired maxillae and pain in the head, neck and/or teeth. Environmental stress was diagnosed by using the Social Readjustment Rating Scale (SRRS). Gender distribution was similar among undergraduate and graduate students, but there were significant differences in the sex ratio of university staff (66.7% were females) and professors (81.8% were males). Prevalence of TMD influenced by stress among women was significantly greater than in men of the same age group ($p=0.0001$), and almost all individuals (90.9%) with TMD had a high level of stress ($p=0.0082$). These findings suggest that there is positive association between TMD and environmental stress.

Key Words:

orofacial pain, questionnaire, stress, temporomandibular joint

Introduction

Temporomandibular disorders (TMD) have been extensively investigated in the last ten years, and several hypotheses have attempted to integrate studies on the etiology, diagnosis and prognosis of these craniofacial pains¹. TMD can be classified according to the signs and symptoms of the affected region, and the patients may present pain in the musculature of the stomatognathic system, mainly in masseter, temporal, medial and lateral pterygoids muscles. These pains, which may be present during masticatory functions, speaking or opening and closing of the mouth, are referred to as myalgia disorders. Noises within the temporomandibular junction (TMJ) and mouth opening limitation and deviation on maximum opening are manifestations of internal disorders²⁻³.

The etiology of TMD has been attributed to muscular inflammatory processes, alterations in the positioning or in the number of teeth and their occlusion, local facial and cranial trauma, and whiplash. However, none of these factors acts alone, and it is always necessary to investigate the patient's adaptive capacity, particularly since the occurrence of TMD is closely related to the individual's emotional well-being⁴.

TMD is one of several somatic manifestations of stress⁵, and some patients with TMD suffer more anxiety than individuals without this condition⁶. In the former group, stress-related emotional factors acting on specific anatomical structures can function as coadjutants in TMD patients. Most patients generally have a large number of symptomatic manifestations⁷ that can confound and complicate the diagnosis. Hence, TMD must be considered as having multiple rather than simply dental causes⁸.

The aims of this study were to: a) identify individuals with extracapsular TMD in a population of students, staff and professors at a public university in the state of São Paulo, Brazil, b) assess the level of environmentally-induced stress in these individuals, c) evaluate the extent to which stress initiated or modified TMD of muscular origin, and d) compare the results obtained among the subjects in this study.

Material and Methods

This study was done at the State University of Campinas (UNICAMP), in Campinas, in the State of São Paulo, Brazil, and was approved by the institutional Ethics Review Board (protocol number 168/2000). Informed consent was obtained from all subjects prior to participation in the study.

Subject selection

According to the university's General Department of Human Resources, the university population includes four groups, namely, 10,328 undergraduate students, 10,467 graduate students, 7,631 staff and 2,012 professors. The number of students is updated annually with new enrollments.

The study method and design were selected by one of the authors (L.V.V.) using a proportional stratified, probabilistic procedure applied to the four groups of university subjects. Using this approach, a representative ratio was calculated for each professional category for a sample of 455 subjects, of whom 151 (33.2%) were undergraduate students, 145 (31.9%) were graduate students, 126 (27.7%) were staff and 33 (7.3%) were professors. These professional categories will be referred to hereafter as *functions*.

Measuring instrument

TMD were diagnosed using an already tested and standardized screening questionnaire based on the one recommended by the American Academy of Orofacial Pain (AAOP)⁴. The questionnaire consisted of eight questions related to jaw pain, including the location of pain, precipitating factors, and temporal pattern of pain, and five questions related to jaw function, including TMJ noises, locking, and difficulty in opening. A validation of this questionnaire done in a university population prior to this study showed a sensitivity of 85.4% and a specificity of 80% for extracapsular disorders⁹.

Environmental stress was diagnosed by using the Social Readjustment Rating Scale (SRRS) described by Holmes and Rahe¹⁰.

Application of the TMD screening questionnaire and SRRS Since most of the university population spends the entire day on the campus, the subjects were recruited upon exiting the institutional cafeterias after lunch, between noon and 2 p.m. This recruiting point was chosen because the individuals had just used their masticatory apparatus, which made identification and confirmation of the symptoms easier. Two dentists specialized in TMD and orofacial pain questioned the potential subjects.

Criteria for inclusion

The subjects were initially approached and received an explanation of the purpose of the study, and then decided whether they wished to participate in the investigation. No verbal explanations were provided to subjects when answering the questions since the questionnaires was self-explanatory. Individuals who were undergoing any type of orthopedic or orthodontic treatment were excluded from the sample.

All of the data were tabulated using the program Excel (Microsoft®). The Kruskal-Wallis test was used for numerical variables and the chi-square test for categorical variables. Multiple Correspondence Analysis (MCA) was used to analyze the conjoint relationship among the variables. The level of significance used was 5%.

Results

Based on literature reports of the age group in which the

Table 1. Distribution of the subjects according to sex in the different groups.

Sex	Undergraduate students		Graduate students		Staff		Professors	
	n	%	n	%	n	%	n	%
Female	64	42.4	68	46.9	84	66.7	6	18.2
Male	87	57.6	77	53.1	42	33.3	27	81.8
Total	151	100.0	145	100.0	126	100.0	33	100.0

n=number of subjects; %=percentage of total ($p=0.0001$; Chi-Square).

Table 2. Occurrence of signs and symptoms of TMD according to age and sex.

Age	Present		Absent	
	Female	Male	Female	Male
17-24 years old	67 (87.1%)	66 (72.5%)	10 (13.0%)	25 (27.5%)
25-44 years old	104 (89.7%)	74 (66.7%)	12 (10.3%)	37 (33.3%)
45-63 years old	25 (86.2%)	18 (58.1%)	4 (13.8%)	13 (41.9%)
Total	196	158	26	75

%=percentage of total ($p=0.0001$; Chi-Square).

Table 3. The frequency of stress according to sex.

Level of stress	Female		Male	
	n	%	n	%
Low (0-150 points)	88	39.6	111	47.64
Moderate (151-299 points)	85	38.3	94	40.34
High (≥ 300 points)	49	22.1	28	12.02
Total	222	100	233	100

n=number of subjects; %=percentage of total; ($p=0.014$; Chi-Square).

highest frequency of TMD has been observed, the subjects were divided into three categories: 17-24 years old ($n=168$, 36.9%), 25-44 years old ($n=227$, 49.9%), and >45 years old ($n=60$, 13.2%). There was an equal distribution of the sexes among undergraduate and graduate students, whereas women were significantly ($p<0.0001$) more common among staff (66.7%) and men were more common among professors (81.8%) (table 1).

The presence of TMD was determined by classifying the pain associated with difficulty in chewing or speaking or with tired maxillae as moderate or strong; pain in the head, neck and/or teeth was scored in a similar manner (table 2). The prevalence of TMD among women in the three age groups was significantly higher than in men of the same age group. Among men, there was a higher prevalence in younger

subjects compared to older ones. Analysis of the SRRS showed that 22.1% of the women had a high level of stress compared with 12.0% of the men (table 3). The SRRS also showed that 90.9% of the individuals with TMD had a high level of stress (table 2), i.e. >300 points (table 4).

Multiple correspondence analysis (MCA) revealed the following relationships:

a) The highest level of stress (>300) was associated with the highest scores (III) in questions 3 (greater difficulty/maxillary pain), 5 (greater maxillary rigidity), 6 (a,b,c) (more pains in the head, neck and teeth), and 8 (alteration in the bite), and was more common in women (right quadrant of the graph, showing the staff and graduate students);

b) Intermediate scores (II) in questions 3 and 5 and intermediate scores in question 6 (a,b,c) were associated with

extracapsular TMD among 25-44-year-old women is significantly higher than in men of the same age group. This age-dependent distribution of the pathology and the greater number of female subjects suggested a possible link between TMD and female hormones¹⁶. Bush, Harkins and Harrington¹⁸ attributed the larger prevalence of TMD in females the fact that women seek treatment or generally care better care of their health than men.

Gender differences in HPA axis function have been demonstrated in animals and humans, and interactions are known to occur between the HPA axis and the hypothalamic-pituitary-gonadal axis at multiple levels. The gender differences in HPA axis function make women more vulnerable to the pathologic sequelae of stress and may account for the female predominance in stress-related disorders¹⁹.

Headaches are a common complaint among adults, but are subjective and are generally not life-threatening. Headaches associated with TMD result from pain originating from the masticatory muscles, TMJ, teeth or cervical areas¹⁸. In a study of the incidence of headache in TMD and non-TMD groups, Pettengill²⁰ found that the TMD group had a greater severity of headaches than the non-TMD group, and that females in the TMD group had the highest values.

Approximately 40% of chronic pain syndromes occur in the craniofacial region²¹, with the most prominent being craniomandibular dysfunctions and cephalalgias caused by muscular contraction. The latter observation suggests that head and neck muscles are particularly sensitive to psychological stress. Most (90.9%) of our patients with a high level of stress had moderate/strong symptoms of TMD. Anxiety and depression²² may be part of this phenomenon by acting as a predisposition and aggravant in cases of TMD.

The association between neck pain and TMJ symptoms was shown by multivariate analysis, when higher levels of stress (≥ 300) were associated with higher scores in the questions that quantified maxillary difficulty/pains, maxillary rigidity, pains in the head, neck and teeth, and alterations in the bite, and associated these effects with women. Among the subjects studied here, the subgroup with the strongest relationship between TMD and stress consisted of women 25-44 years old. This age interval included the majority of staff and graduate students. Gender, age and socioeconomic differences have provided insights into the risk factors for TMD, and have led to broader biopsychosocial investigations of the causes of this pathology.

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