

Prevalence and factors associated with alterations of the temporomandibular joint in institutionalized elderly

Prevalência e fatores associados a alterações na articulação temporomandibular em idosos institucionalizados

Annie Karoline Bezerra de Medeiros ¹
Fernanda Pinheiro Barbosa ¹
Grasiela Piuvezam ²
Adriana da Fonte Porto Carreiro ¹
Kenio Costa Lima ¹

Abstract *This article aims to analyze the prevalence and associated factors of TMJ alterations in elderly institutionalized. An cross-sectional study of 1192 elderly institutionalized in Brazil was undertaken. Intra and extra-oral exams were performed and the TMJ was evaluated based on the Oral Health Assessment Form of the WHO (1997). Demographic data and elderly dependence were also collected. The self-perception of the elderly regarding oral health was measured using the Geriatric Oral Health Assessment Index - GOHAI. Data analysis was performed using the Chi-squared test and robust Poisson regression (level of significance of 5%). The prevalence of TMJ alteration was low compared to adults and was only associated with the state of dependence of the elderly individual (independent had 45.4% more alterations than dependent individuals), gender (women had 47.4% more alterations), self-perception of oral health (who evaluated negatively had 65.6% more alterations) and the need of upper dentures (who needed some kind of upper dentures had 45.8% more alterations than those who did not). Despite being low, the presence of alterations in the TMJ was more frequent in elderly independent, women, who evaluated negatively oral health and need some kind of upper dentures.*

Key words *Temporomandibular joint, Aged, Institutionalization*

Resumo *O objetivo deste artigo é avaliar a prevalência e os fatores associados a alterações na ATM em idosos institucionalizados. Estudo observacional e transversal, conduzido em 1.192 idosos brasileiros. Foram realizados exames intra e extraoral, baseados na Ficha de Avaliação da OMS (1997). Dados demográficos e nível de dependência também foram coletados. A autopercepção do idoso quanto à saúde bucal foi obtida através do GOHAI (Geriatric Oral Health Assessment Index). Na análise dos dados foram usados o teste do Qui-quadrado e a Regressão robusta de Poisson (nível de significância de 5%). A presença de alguma alteração na ATM foi pouco prevalente quando comparada a dos adultos, e esteve associada à condição de dependência do idoso (os independentes tiveram 45,4% mais alterações do que os dependentes), ao sexo (mulheres tiveram 47,4% mais alterações), à autopercepção de saúde bucal (quem avaliou negativamente teve 65,6% mais alterações) e à necessidade de prótese (PT) superior (quem necessita de algum tipo de PT superior teve 45,8%). Apesar de ter sido baixa, a presença de alterações na ATM esteve mais frequente em idosos independentes, do sexo feminino, que avaliaram negativamente a saúde bucal e que necessitam de algum tipo de PT superior.*

Palavras-chave *Articulação temporomandibular, Idoso, Saúde do idoso institucionalizado, Institucionalização*

¹ Departamento de Odontologia, Centro de Ciências da Saúde, Universidade Federal do Rio Grande do Norte (UFRN). Av. Salgado Filho 1787, Lagoa Nova. 59056-000 Natal RN Brasil. annie_medeiros@hotmail.com
² Departamento de Saúde Coletiva, Centro de Ciências da Saúde, UFRN. Natal RN Brasil.

Introduction

The jaw is joined to the base of the cranium by the temporomandibular joint (TMJ), which is responsible for the translational and rotational motion of the jaw during the actions of speaking and chewing¹.

Initiating, contributing and perpetuating factors can lead to alterations in the TMJ, which can cause the functional imbalance of the organism, affect the masticatory musculature and adjacent structures^{2,3}, and is characterized as temporomandibular disorder (TMD). This can be identified by a series of signs and symptoms, such as muscular pain or pain in the TMJ, joint noises and restriction, diversion or deflection during the movement of the mouth opening³.

A number of studies have found that multiple factors can lead to the development of this disorder and that it is therefore caused by an association of psychological, structural and behavioral factors^{2,4}.

The percentage of the population with some form of TMD is between 40 and 60%^{4,5}. According to Fonseca *et al.*⁶, it was estimated that in Brazil, there are approximately six million individuals with signs and symptoms of TMD. However, the current prevalence of the condition among the population is the subject of debate, due to the low homogeneity of criteria used for the study of different groups⁴. Pereira Júnior *et al.*⁷, in a review of epidemiological factors, concluded that the prevalence of TMD is low among children, increases among teenagers and adults, and decreases after 45 years of age, being rare among the elderly⁵.

The elderly in Brazil, similar to many countries in the world, is currently the proportionally fastest growing segment of the population, which demands attention for care services⁸. In relation to oral health, root caries, periodontal disease and the high degree of edentulism represent the major problems^{2,8}. The high toothlessness rates is considered a worldwide public health issue⁹. The edentulism can generate a collapse in the stomatognathic system, orthopedic instability of TMJ and physical and psychological problems associated with changes in the maxillomandibular relationship, induced during the confeccion of dentures by dentists^{2,10,11}. That serve as contributing factors to the development of TMJ alterations^{2,10,11}.

Studies evaluating the prevalence of signs and symptoms of TMJ alterations in the elderly, whether institutionalized or not, are few and

showed conflicting results regarding prevalence and associated factors^{5,7,10,11}. This is due mainly to the different types of instruments used to assess prevalence, which vary widely between studies, as well as regional differences, and the fact that many studies were performed in a single center with a limited sample.

As the elderly have a high tooth loss and, in most cases, have no access to dentures⁹, it is possible that they have alterations in TMJ. Thus, the aim of the present study was to evaluate the prevalence and the factors associated with the signs and symptoms suggestive of temporomandibular joint alterations in elderly institutionalized Brazilians.

Methodology

The research was conducted following approval from the local Ethics in Research authority. An observational, transversal, multicenter study was conducted in 36 long-term care facilities (LTCF) for the elderly, registered with the Health Inspection Department, in 11 randomly chosen medium and large sized municipalities from the five geographic regions of Brazil (North, Northeast, South, Southeast, and Midwest).

Two cities were randomly drawn from each region, obeying two inclusion criteria: 1) municipalities with more than 100,000 inhabitants, according to the Population Projection List of Geography and Statistics Brazilian Institute (IBGE, 2004) for 2005; and 2) municipalities with an elderly population greater or equal to the median found in each geographic region. The LTCF studied were legally registered private and philanthropic entities.

Eligibility criteria for the elderly participants were 1) being institutionalized and 2) being present at the LTCF during the data collection period. So, all elderly individuals aged 60 years or more (in accordance with the legal guidelines of the National Health Policy for Older Persons - 2006) were selected¹².

The elderly individuals underwent an assessment using the Oral Health Assessment Forms recommended by the WHO¹³, which included the following sections: identifying information about the survey, other general information (name, gender, age, ethnic group, occupation, geographic location and type of locality), extra-oral examination, assessment of temporomandibular joint. The intraoral examination evaluated dental caries and need of treatment, using the DMFT in-

dex, edentulism and functional edentulism (less than 20 teeth in the mouth), the use and need of dentures, according to WHO criteria¹³.

For the evaluation of the temporomandibular joint (TMJ) the following criteria were analyzed: symptoms (when the patient reported occurrence of cracking, pain, difficulty opening or closing the jaw, once or more per week) and signs (occurrence of cracking, tenderness or reduced mobility of the jaw). Cracking, in one or both TMJ, was defined as an audible sharp sound or palpation. The tenderness of the anterior temporal and/or masseter on one or both sides, was registered only if the palpation triggered, spontaneously, a reflex of withdrawal or a complaint of pain, and reduced mobility of the jaw was identified when the mouth opening was less than 30 mm¹³.

The doctors of each LTCF examined the elderly individuals in order to diagnose if they had the cognitive ability to respond to questionnaires, based in a mental evaluation. Those able to respond cognitively responded to the GOHAI (Geriatric Oral Health Assessment Index) questionnaire developed by Atchinson & Dolan¹⁴, in 1990, in order to evaluate the perception of the elderly regarding their oral health. This index is composed of twelve items which consist of information regarding the influences of oral health problems in three dimensions: physical (chewing, swallowing and speech), psychological (social limitations caused by oral health, appearance of teeth, concerns about teeth, gums, or prostheses), and pain or discomfort¹⁴. Its outcome was categorized as positive (31-36 points) and negative (0-30 points)¹⁵. The elderly were also evaluated for their dependency status as per clinical diagnosis of the LSIE doctor and were classified as dependent or independent, related to the ability to perform certain daily activities.

Data collection was carried out by five calibrated dentists with Kappa values between 0.71 and 0.89 and the tests were performed in the LTCF environments with natural light. A clinical dental mirror and periodontal probe recommended by the WHO were used for periodontal examinations.

Statistical analysis

Statistical analysis was conducted using the STATA 10.0 program (Stata Corp., College Station, TX, USA). Data was described using frequency, percentages and means, and standard deviations. In order to find association between the independent variables and the dependent

variable "TMJ Alteration" (symptom, sensitivity, cracking or reduced mouth opening), the Chi-squared test with continuity correction for a significance level of 5% was used.

Two multivariate analyses (robust Poisson regression) were used. In one, the association between the independent variables with a value $p < 0.20$ and the dependent variable ("Presence of TMJ Alteration") was analyzed, in which the sample corresponded to 582 individuals who were cognitively able to respond to the GOHAI questionnaire. A second analysis was performed with these same variables, without self-perception of oral health, which allowed the multiple analysis to consider the total number of elderly individuals ($n = 1,158$).

Results

The resident population at the LTCF during the study period numbered 1412 individuals. Of these, 1192 (84.4%) took part in this investigation, 587 (49.2%) of whom presented with cognitive conditions when responding to the GOHAI, according to the clinical diagnosis made by LTCF doctors.

The mean age of the elderly persons was 76.26 years (± 9.8). The majority of the individuals were female, resided in nonprofit LTCF (Long Term Care Facilities) for the elderly and were diagnosed as dependent (Table 1). In relation to self-perception of oral health, 75% of the elderly persons who responded to the GOHAI (49.2% of the total sample) presented a positive evaluation and 25% negative, while the DMF index (Number of decayed, missing or filled teeth) was high, as was the "missing teeth" component (Table 1).

Of the total of elderly persons enrolled in the study, there was a loss of data of 34 individuals, approximately 2.8% of the sample, due to the refusal of the same to undergo an extra or intraoral exam. In relation to evaluation of the temporomandibular joint (TMJ), edentulism and the use and need for dentures, the sample included 1,158 individuals.

The majority of elderly individuals had either functional (87.6%) or total edentulism (58.6%). Less than half of elderly individuals used some type of upper (38.6%) or lower (20.8%) dentures, whether satisfactory or not. The need for prosthesis was high for upper (61.8%) and lower (78.7%) dentures.

When analyzed separately, the criteria used for assessing the TMJ showed a low prevalence

of alterations in the group studied. As such, these were grouped into a single variable (Any TMJ alteration) in order to allow a better analysis of the relationship between the presence of any of these changes and the associated factors (Figure 1).

Table 2 displays the results of the analysis between the dependent variable “Any TMJ alter-

ation” and the independent variables, which represented the associated factors.

The analysis of the effect of the independent variables on the dependent showed that the only significant association was between the condition of dependency, self-evaluated oral health, gender and need for upper dentures. Independent elder-

Table 1. Distribution of elderly persons by gender, type of LTCF, state of dependence of elderly person and dental condition.

Variables		n	%
Gender			
Male		554	46.5
Female		638	53.5
LTCF			
Profit		160	13.9
Non-profit		998	86.1
Level of dependence of elderly person			
Independent		469	40.5
Dependent		689	59.5
DMFT and components			
		Mean	SD
DMFT Index		29.4	4.927
Number of intact teeth		2.44	4.770
Number of decayed teeth		1.21	2.689
Number of decayed and filled teeth		0.05	0.310
Number of filled teeth		0.29	1.180
Number of missing teeth		27.8	6.791
Number of teeth present		3.99	6.637
Total number of decayed teeth (decayed + filled cavities)		1.26	2.729

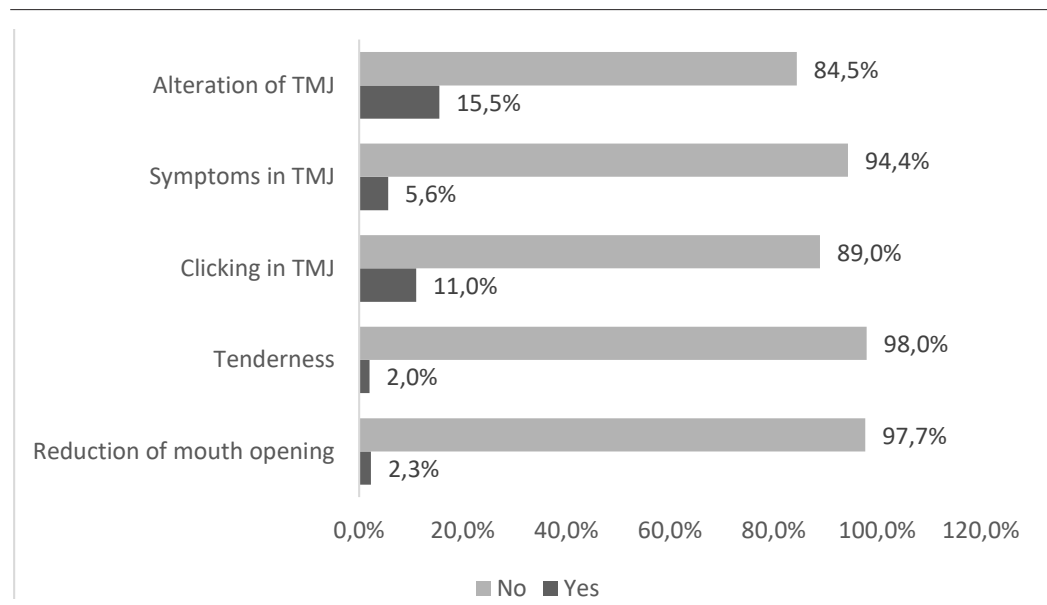


Figure 1. Distribution of TMJ alterations among elderly persons, in terms of categorized variables (Symptom, Sensitivity, Clicking or Reduced mouth opening) and discriminated variables.

Table 2. Bivariate analysis of variable “presence of TMJ alteration” related to variables independents of study.

Variables	TMJ alteration		p	PR (CI 95%)
	No n (%)	Yes n (%)		
General data				
Gender				
Male	469 (86.2)	75 (13.8)	0.162	1.229 (0.935 – 1.615)
Female	510 (83.1)	104 (16.9)		
Age				
60 to 77 years	518 (83.1)	105 (16.9)	0.181	0.821 (0.624 – 1.080)
78 years or more	461 (86.2)	74 (13.8)		
Type of LTCF				
Profit	148 (92.5)	12 (7.5)	0.004	2.231 (1.273 – 3.912)
Non-profit	831 (83.3)	167 (16.7)		
Level of dependence				
Independent	370 (78.9)	99 (21.1)	<0.001	0.550 (0.420 – 0.721)
Dependent	609 (88.4)	80 (11.6)		
Self-perception of oral health				
Positive evaluation (31 to 36)	360 (82.9)	74 (17.1)	0.002	1.739 (1.256 – 2.408)
Negative evaluation (0 to 30)	102 (70.3)	43 (29.7)		
<i>Oral health condition</i>				
Presence of edentulism				
Non-edentulous	409 (85.0)	72 (15.0)	0.760	1.010 (0.961 – 1.061)
Edentulous	570 (84.2)	107 (15.8)		
Functional edentulism				
Non-functionally edentulous	117 (81.8)	26 (18.2)	0.401	0.963 (0.888 – 1.045)
Functional edentulism	862 (84.9)	153 (15.1)		
Use of upper dentures				
Absent	590 (83.8)	114 (16.2)	0.607	0.978 (0.931 – 1.028)
Present	389 (85.7)	65 (14.3)		
Use of lower dentures				
Absent	766 (83.9)	147 (16.1)	0.285	0.965 (0.912 – 1.021)
Present	213 (86.9)	32 (13.1)		
Need of upper dentures				
Not needed	390 (86.9)	59 (13.1)	0.098	1.288 (0.965 – 1.719)
Some form of denture needed	589 (83.1)	120 (16.9)		
Need of Lower dentures				
Not needed	218 (87.2)	32 (12.8)	0.225	1.040 (0.984 – 1.100)
Some form of denture needed	761 (83.8)	147 (16.2)		

ly individuals had 45.4% more alterations than dependent individuals. Elderly who negatively evaluated their oral health had 65.6% more alterations than those who evaluated oral health positively. Women had 47.4% more alterations than men and those who needed some kind of upper dentures had 45.8% more alterations than those who did not need dentures (Tables 3 and 4).

No other variable objectively related to the condition of oral health showed significant association with the presence of TMJ alterations.

Discussion

The purpose of the present study was to evaluate the prevalence and the factors associated with the signs and symptoms suggestive of temporomandibular joint alterations in elderly institutionalized Brazilians. The results show a low prevalence of temporomandibular joint (TMJ) alterations and that the main factors associated with the presence of alterations (reported by the patients, tenderness, clicking, or reduced mouth opening)

Table 3. Multivariate analysis of variable “presence of TMJ alteration” related to variables “gender”, “age”, “type of LTCF”, “level of dependence of elderly person”, “self-perception of oral health” and “need of upper dentures”.

Variables	TMJ alteration				
	Yes n (%)	p	PR (CI 95%)	p	PR (CI 95%)
Gender					
Male	57 (19.0)	0.453	1.032	0.148	1.285
Female	60 (21.5)		(0.950 – 1.120)		(0.915-1.805)
Age					
60 to 77 years	79 (22.1)	0.144	0.940	0.177	0.789
78 years or more	38 (17.1)		(0.866 – 1.019)		(0.560-1.113)
Type de LTCF					
Profit	2 (5.7)	0.028	1.196	0.100	3.129
Non- profit	115 (21.1)		(1.090 – 1.311)		(0.804-12.178)
Level of dependence					
Independent	97 (22.6)	0.015	0.893	0.024	0.606
Dependent	20 (13.3)		(0.824 – 0.968)		(0.392-0.937)
Self-perception of oral health					
Positive evaluation (31 to 36)	74 (17.1)	0.001	1.179	0.002	1.656
Negative evaluation (0 to 30)	43 (29.7)		(1.052 – 1.322)		(1.201-2.284)
Need of upper dentures					
Not needed	45 (17.5)	0.149	1.062	0.164	1.284
Need of dentures	72 (22.4)		(0.980 – 1.152)		(0.903-1.825)

Model adjustment (χ^2): $p=0.808$ **Table 4.** Multivariate analysis of variable “presence of TMJ alteration” related to variables “gender”, “age”, “type of LTCF”, “level of dependence of elderly person” and “need of upper dentures”.

Variables	TMJ alteration				
	Yes n (%)	p	PR (CI 95%)	p	PR (CI 95%)
Gender					
Male	75 (13.8)	0.162	1.229	0.006	1.474
Female	104 (16.9)		(0.935 – 1.615)		(1.117 – 1.945)
Age					
60 to 77 years	105 (16.9)	0.181	0.821	0.417	0.894
78 years or more	74 (13.8)		(0.624 – 1.080)		(0.682 – 1.172)
Type of LTCF					
Profit	12 (7.5)	0.004	2.231	0.060	1.732
Non-profit	167 (16.7)		(1.273 – 3.912)		(0.985 – 3.044)
Level of dependence					
Independent	99 (21.1)	<0.001	0.550	<0.001	0.546
Dependent	80 (11.6)		(0.420 – 0.721)		(0.416 – 0.717)
Need of upper dentures					
Not needed	59 (13.1)	0.098	1.288	0.011	1.458
Need of prosthesis	120 (16.9)		(0.965 – 1.719)		(1.090 – 1.951)

Model adjustment (χ^2): $p=0.848$

correspond, principally, to factors that indirectly assess the oral health of the individuals. Tooth loss and need for prosthesis were not associated with the presence of alterations in TMJ.

In relation to the low prevalence, when compared to prevalence in adults, other studies present similar results^{11,16,17}. Schmitter et al.¹⁶ evaluating the presence of different symptoms

of Temporomandibular Disorder (TMD) in a group of institutionalized elderly persons in Germany, used the RDC/TMD (Research Diagnostic Criteria for Temporomandibular Disorders). The results showed that none of the elderly persons suffered from pain in the TMJ or during mouth opening or closing movements, however, 38% had joint sounds. Johansson et al.¹⁸, in 2006, evaluating the prevalence of signs and symptoms of TMD among 6,236 elderly persons, found different results. In this study, 44.7% of individuals suffered from pain in the TMJ and 51.1% had difficulty in mouth opening.

These studies show that there is still inconsistency as to the findings regarding the prevalence of signs and symptoms in elderly persons with TMD. The aetiology of TMD is multifactorial including biological characteristics, occlusal disharmony, psycho-emotional disturbance or impaired systemic health. The adaptability of the individual also plays an important role and can be a relevant factor that may explain the low prevalence. So, the human musculoskeletal system is adaptable and can tolerate considerable variation without showing signs of disease or dysfunction¹⁹.

These findings are also due to the lack of standardization of the questionnaires and methods of assessment used and the size of the selected samples. The RDC/TMD is currently the most widely used questionnaire for assessing TMD, however, due to its length, it makes the data collection process difficult and limits the scope of the study to smaller samples. The present study used the questionnaire recommended by the WHO (1997) and sought a full assessment of the oral health status of the individual being studied, linking general and socioeconomic data to the physical examination, providing wide scope and applicability¹³.

In multivariate analysis of the number of subjects who responded to the GOHAI (n = 582), an alteration in TMJ was only significantly associated with the condition of dependency of the elderly person and self-evaluation of oral health status. An independent elderly individual who negatively evaluates their oral health is more likely to have experienced a TMJ alteration.

Of the 49.2% of seniors who responded to the GOHAI, 75% had a positive perception of their oral health, which is in agreement with other studies^{20,21}. Studies have shown that there is a paradox between the self-perception of oral health by institutionalized elderly persons. Objective evaluation reveals a poor condition of

oral health, while seniors evaluate their own oral health as good or excellent^{17,21,22}. The authors hypothesize that these results can be associated with the influence of social and cultural factors^{21,22}.

In the analysis of the present study, negative valuation of oral health status was low, however, in multivariate analysis, this was significantly associated with the presence of an alteration of the TMJ. This is perhaps because elderly persons who negatively evaluate their oral health are those that have more teeth or use dentures, and in most cases, both are in poor condition, generating complaints and reflecting an unsatisfactory health condition^{21,22}.

In aetiology of TMJ disorders, stress and emotional component are two important contributing factors^{10,19}. When they are present and associated with a low adaptability of the individual, they can contribute to the development of signs and symptoms of joint dysfunction¹⁹. Despite not being the object of this research, it is suggested that there may be an association between negative assessment of oral health condition and these two factors. This relationship could contribute to the development of alterations in TMJ and explain the results. More specific studies are needed to assess this possible relationship.

Another significant variable that was strongly associated with the presence of alteration of the TMJ was the degree of dependency of the elderly person. Dependency is considered a serious health problem that interferes with the quality of life of both the caregiver and the elderly person, who needs help to perform basic activities of daily living, such as self-care, including oral hygiene^{23,24}.

Therefore, the significant association of the independence of elderly persons with the presence of an alteration of the TMJ can be explained by the fact that independent elderly persons still use dentures (whether satisfactory or not), perform their own oral hygiene care and are conscious of their oral health condition, whether it is good or bad. In certain situations in LTCFs, the dentures of totally dependent elderly individuals are removed by caregivers to reduce the care provided to the elderly, such as oral hygiene.

The analysis of the total number of elderly individuals that took place in the present study revealed that the variables most associated with the presence of some kind of alteration in the TMJ were gender, and the need of some form of upper denture.

The studied population was elderly, with an average age of 76.26 years. Lopes et al.²⁵ and Vi-

torino *et al.*²⁶ reported a similar mean of 75 and 76.5 years, respectively, as the authors see advanced age as a strong predictor for institutionalization.

There was also a greater prevalence of institutionalized female elderly persons, and such a result may be attributed to the fact that the life expectancy of the female is greater than that of the male²². Abud *et al.*¹⁷, in 2009, assessed the prevalence of TMD in institutionalized elderly persons in São José dos Campos, Brazil. The results showed a higher prevalence of symptoms of TMD among women, corroborating the findings of other studies^{5,10,27}. In order to explain this phenomenon, Martins *et al.*⁵, reported that one of the reasons for these findings is the fact that women present an unfavorable self-assessment of their oral health condition, referring more often to psychological problems and morbidities.

The “need of upper denture” is a variable that reflects the presence of some kind of edentulous space that has not been rehabilitated or has been rehabilitated in an unsatisfactory manner, and was significantly associated with the presence of an alteration of the TMJ.

Dallanora *et al.*¹⁰, in 2012, used the Helkimo index and a personalized questionnaire to evaluate the prevalence of TMD in 127 residents of Luzerna/SC, who complied with the inclusion criteria of using full upper dentures, of which 113 were elderly (89%). The results showed a prevalence of TMD of 55.12%, with those individuals that used the same dentures for a period of more than 10 years having more signs and symptoms of TMD.

Following the same idea, in 2013, Sipila *et al.*²⁷ analyzed 6,316 people in Finland, evaluating signs and symptoms of TMD and associated factors such as use, condition of removable dentures and the need of repair of the same. Of these individuals, 1,457 were elderly. The results showed a low prevalence of TMD in the elderly, but edentulism, use of full dentures and poor condition of the denture (older than 5 years) were negatively associated with pain in the TMJ and chewing muscles, as well as the presence of joint sounds. The authors suggest that the problems in the use of prosthesis may predispose to TMD problems. However, it is unclear how.

A limitation of this study was not using RDC/TMD criteria. However, due to the high number of patients included and the length of the questionnaire, the collection of data would be impractical. The WHO criteria was used because it is internationally validated, be more concise and applicable in epidemiological studies.

Therefore, with this study, it could be perceived that the prevalence of signs and symptoms of alterations in the TMJ, as found by other authors, is low in institutionalized elderly persons and that female, dependent, elderly individuals, who have a negative perception of their oral health and require some type of upper dentures, exhibit more alterations of the temporomandibular joint. Despite these results, should be considered the individuality of the elderly and the regional and cultural characteristics which may influence the findings. The aetiology of the TMJ disorder is multifactorial and the individual component plays an important role. Furthermore, studies carried out are distinct as the population. Thus, the discussion of the factors associated with TMJ should be made carefully. It is required the implementation of further studies that follow the same methodological design and use similar population groups.

Conclusions

The present study reflects a scenario in which there is low prevalence of signs and symptoms of alterations of the TMJ in elderly institutionalized persons and that the main factors associated with the presence of alterations of the TMJ correspond, principally, to factors that indirectly assess the oral health of the individuals. As such, more independent female elderly persons, who negatively evaluated their oral health and required some form of upper denture, are classified as suffering from alterations of the temporomandibular joint (TMJ). Psychosocial factors can have a modifying effect on these associations. Thus, strategies to improve the quality of life, to exploring the importance of health care and the need for denture replacement, as prevention of total dental loss, are important to improve oral health and minimize the local risk factors for TMJ alterations.

Collaborations

AKB Medeiros worked in intellectual and scientific content of the study; acquisition, interpretation, analysis of data and manuscript writing. FP Barbosa worked in acquisition, interpretation and analysis of data and manuscript writing. G Piuvezam and AFP Carreiro worked in the interpretation and analysis of data, writing and revision of manuscript. KC Lima worked in the conception, design, intellectual and scientific content of the study, interpretation, analysis of data and writing of the manuscript.

References

1. Alomar X, Medrano J, Cabratosa J, Clavero JA, Lorente M, Serra I, Monill JM, Salvador A. Anatomy of the temporomandibular joint. *Semin Ultrasound CT MR* 2007; 28(3):170-183.
2. Bontempo KV, Zavanelli RA. Fatores etiológicos correlacionados à desordem temporomandibular em pacientes portadores de próteses totais bimaxilares: uma análise comparativa. *RGO* 2009; 57(1):65-75.
3. Manfredini D, Piccotti F, Ferronato G, Guarda-Nardini L. Age peaks of different RDC/TMD diagnoses in a patient population. *J Dent* 2010; 38(5):392-399.
4. Martins RJ, Garbin CAS, Garcia AR, Garbin AJI, Miguel N. Stress levels and quality of sleep in subjects with temporomandibular joint dysfunction. *Rev Odontol Ciênc* 2010; 25(1):32-36.
5. Martins RJ, Garcia AR, Garbin CAS, Sundefeld MLMM. Relação entre classe socioeconômica e fatores demográficos na ocorrência da disfunção temporomandibular. *Cien Saude Colet* 2008; 13(2):2089-2096.
6. Fonseca DM, Valle GBAL, Freitas SFT. Diagnóstico pela anamnese da disfunção craniomandibular. *RGO* 1994; 42(1):23-28.
7. Pereira Júnior FJ, Vieira AR, Prado R, Miasato JM. Visão geral das desordens temporomandibulares. Parte I: definição, epidemiologia e etiologia. *RGO* 2004; 52(2):117-121.
8. Simões ACA, Carvalho DM. A realidade da saúde bucal do idoso no Sudeste brasileiro. *Cien Saude Colet* 2011; 16(6):2975-2982.
9. Piuvezam G, Lima KC. Factors associated with missing teeth in the Brazilian elderly institutionalised population. *Gerodontology* 2013; 30(2):141-149.
10. Dallanora AF, Grasel CE, Heine CP, Demarco FF, Pereira-Cenci T, Presta AA, Boscato N. Prevalence of temporomandibular disorders in a population of complete denture wearers. *Gerodontology* 2012; 29(2):865-869.
11. Santos JF, Marchini L, Campos MS, Damião CF, Cunha VP, Barbosa CM. Symptoms of craniomandibular disorders in elderly Brazilian wearers of complete dentures. *Gerodontology* 2004; 21(1):51-52.
12. Brasil. Portaria GM nº 2.528, de 19 de outubro de 2006 - Política Nacional de Saúde da Pessoa Idosa - PNSI. *Diário Oficial da União* 2006; 19 out.
13. Organização Mundial da Saúde (OMS). *Levantamento epidemiológico básico de saúde bucal: manual de instruções*. 4ª ed. São Paulo: Editora Santos; 1997.
14. Atchison KA, Dolan TA. Development of the geriatric oral health assessment index. *J Dent Educ* 1990; 54(11):680-686.
15. Silva DD, Souza MLR, Wada RS. Self-perception and oral health conditions in an elderly population. *Cad Saude Publica* 2005; 21(4):1251-1259.
16. Schmitter M, Rammelsberg P, Hassel A. The prevalence of signs and symptoms of temporomandibular disorders in very old subjects. *J Oral Rehabil* 2005; 32(7):467-473.
17. Abud MC, Santos JFF, Cunha VPP, Marchini L. TMD and GOHAI indices of Brazilian institutionalized and community-dwelling elderly. *Gerodontology* 2009; 26(1):34-39.

18. Johansson A, Unell L, Carlsson GE, Söderfeldt B, Halling A. Risk factors associated with symptoms of temporomandibular disorders in a population of 50- and 60-year-old subjects. *J Oral Rehabil* 2006; 33(7):473-481.
19. Okeson JP. *Tratamento das Desordens Temporomandibulares e Oclusão*. 7ª ed. Rio de Janeiro: Elsevier; 2013.
20. Martins AMEB, Barreto SM, Pordeus IA. Objective and subjective factors related to self-rated oral health among elderly. *Rep Public Health* 2009; 25(2):421-434.
21. Piuevzam G, Lima KC. Self-perceived oral health status in institutionalized elderly in Brazil. *Arch Gerontol Geriatr* 2012; 55(1):5-11.
22. Melo LA, Sousa MM, Medeiros AKB, Carreiro AFP, Lima KC. Factors associated with negative self-perception of oral health among institutionalized elderly individuals. *Cien Saude Colet* 2016; 21(11):3339-3346.
23. Marinho LM, Vieira MA, Costa SM, Andrade JMO. Grau de dependência de idosos residentes em instituições de longa permanência. *Rev Gaúcha Enferm* 2013; 34(1):104-110.
24. Souza EHA, Barbosa MBCB, Oliveira PAP, Espíndola J, Gonçalves KJ. Impact of oral health in the daily life of institutionalized and non institutionalized elder in the city of Recife (PE, Brazil). *Cien Saude Colet* 2010; 15(6):2955-2964.
25. Lopes MC, Oliveira VMB, Flório FM. Oral condition, habits and treatment necessity of institutionalized elders in Araras (SP, Brazil). *Cien Saude Colet* 2010; 15(6):2949-2954.
26. Vitorino LM, Paskulin LMG, Vianna LAC. Qualidade de vida de idosos da comunidade e de instituições de longa permanência: estudo comparativo. *Rev. Latino-Am. Enfermagem* 2013; 21(n. esp.):3-11.
27. Sipilä K, Närpänkangas R, Könönen M, Alanen P, Suominen AL. The role of dental loss and denture status on clinical signs of temporomandibular disorders. *J Oral Rehabil* 2013; 40(1):15-23.

Artigo apresentado em 13/03/2017

Aprovado em 01/06/2017

Versão final apresentada em 03/06/2017