

Signs and symptoms of Temporomandibular Disorders in the elderly

Sinais e sintomas dos Transtornos Temporomandibulares em Idosos

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ABSTRACT

Purpose: This study investigated the prevalence of Temporomandibular Disorders (TMD) in the elderly and its association with palpation of the temporomandibular joint (TMJ), masticatory and cervical muscles as well as the presence of headache and joint noises. **Methods:** The sample consisted of 200 elderly of both genders (mean age: 69.2±5.7 years). The clinical evaluation of TMD signs and symptoms was divided into three stages: an anamnestic questionnaire, a TMJ evaluation, and a muscular examination. The results were analyzed through descriptive statistics as well as using χ^2 and the tendency tests. **Results:** The presence of TMD was observed in 61% of the sample (mild: 43.5%, moderate: 13%, severe: 4.5%). A significantly greater prevalence of TMD was found for females (72.4%) compared with that for men (41.1%) ($p<0.0001$). Additionally, a significant association among TMD severity and palpation of the TMJ ($p=0.0168$), of masticatory muscles ($p<0.0001$), and of cervical muscles ($p<0.0001$) was verified. Also, there was a significant association between the frequency of headaches and the presence of TMD ($p=0.0001$). The association between the presence of joint noises and sensitivity to TMJ palpation was not significant. **Conclusion:** The elderly presented high TMD prevalence, mostly in females, with mild severity and related to TMJ and masticatory/cervical muscles palpation. Thus, the accomplishment of a detailed clinical examination to investigate the presence of such disorders is essential and it must not be neglected during the treatment of elderly patients.

RESUMO

Objetivo: O objetivo deste estudo foi investigar a prevalência de Transtornos Temporomandibulares (DTM) em idosos e sua associação com a palpção da articulação temporomandibular (ATM), dos músculos mastigatórios e cervicais, bem como com a presença de dores de cabeça e ruídos articulares. **Métodos:** A amostra foi composta por 200 idosos, de ambos os gêneros (média de idade: 69,2±5,7 anos). A avaliação clínica dos sinais e sintomas foi dividida em três etapas: aplicação de questionário anamnético, avaliação da ATM e exame muscular. Os resultados foram avaliados por meio de estatística descritiva, teste do χ^2 e teste de tendência. **Resultados:** A presença de DTM foi observada em 61% da amostra (leve: 43,5%, moderada: 13%, intensa/grave: 4,5%). Verificou-se prevalência significativamente maior de DTM para as mulheres (72,4%) em comparação aos homens (41,1%) ($p<0,0001$). Houve associação significativa entre a severidade da DTM e a presença de dor à palpção da ATM ($p=0,0168$), dos músculos mastigatórios ($p<0,0001$) e cervicais ($p<0,0001$). Observou-se associação significativa entre a frequência de dores de cabeça e a presença de DTM ($p=0,0001$). Não houve associação significativa entre a presença de ruídos articulares e a sensibilidade à palpção da ATM. **Conclusão:** Os idosos apresentaram alta prevalência de DTM, em sua maioria no gênero feminino, de grau leve, relacionada à palpção na ATM e nos músculos mastigatórios e cervicais. Assim, é essencial a realização de um completo exame clínico para investigar a presença desses transtornos, especialmente durante o tratamento de idosos.

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Conflict of interests: nothing to declare.

INTRODUCTION

Population aging throughout the world has become an undeniable fact⁽¹⁾. Although aging is a natural process, it leads to some changes in the human body. Knowledge as to the characteristics and transformations suffered by individuals with the advancement of age, whether systemic, physiological or anatomic, in addition to health-related factors that arise from life style, play a relevant part in care giving for the elderly⁽²⁾.

An interesting aspect of this population is the study of signs and symptoms of Temporomandibular Disorders (TMD), since the prevalence of such pathology has grown considerably over the past decades⁽³⁻⁶⁾. TMD include pathologies associated to masticatory muscles, to the temporomandibular joint (TMJ), or to both of them⁽⁷⁾. Throughout the aging process, a functional overload in the TMJ may occur, caused by the following reasons: lack of replacement of lost teeth, parafunctional habits, a deficient occlusion, or, as yet, traumas — alterations which could give rise to TMD in the elderly⁽⁸⁾.

The prevalence of TMD has been extensively studied in children and adolescents^(5,6,9,10), but the results of studies with the elderly population are as yet inconsistent, since no agreement concerning the prevalence of signs and symptoms of TMD is verified amongst various age ranges^(4,5,8,11-13).

The symptoms related to TMD in the elderly tend to diminish, while clinical signs increase with age. An interpretation of these results is that signs and symptoms of TMD, in general, do not progress to a deterioration of the masticatory function and to the presence of pain, but, rather, tend to disappear with age⁽³⁾.

Epidemiological studies^(4,8,13,14) on the signs and symptoms of TMD report a great variation in the rate of prevalence^(4,5,8,11,13), probably due to methodological deficiencies to the detriment of actual differences between the samples⁽³⁾.

However, headache, ear pain, noise perception, tinnitus and vertigo frequently occur in patients with TMD and palpation of painful temporomandibular structures^(15,16).

Studies have shown a relationship between TMD and dysphonia and orofacial functions, as well as quality of life in oral health. This occurs due to the fact that TMD etiologic factors are common to dysphonia, such as excessive tension in the cervix and orofacial region and mouth opening restriction, since mandibular movement limitation during speech can affect voice acoustics^(17,18).

Taking into account the lack of consensus in the literature regarding the prevalence of signs and symptoms of TMD in the elderly, and keeping in mind that such a condition may interfere in their quality of life⁽¹⁹⁾, investigating the prevalence of TMD in the elderly was deemed most appropriate.

Thus, the objective of this study was to investigate the prevalence of TMD in the elderly, and its association with palpation of the TMJ, masticatory and cervical muscles as well as the presence of headache and joint noises.

METHODS

This study has been approved by the Research Ethics Committee of the University of Northern Paraná (PP/0070/09).

During the screening process, volunteers were informed the objectives of the study and they signed the Informed Consent Letter before any clinical procedure.

The sample of the study consisted of 200 physically independent elderly (mean age: 69.2±5.7 years), of both genders: 127 women and 73 men.

As criteria of inclusion in the study, the elderly should have natural teeth or prostheses (denture, removable partial denture or fixed partial denture), with a functional occlusion. Individuals should be rehabilitated for at least one year before the beginning of the study, since the permanence without prostheses may influence the process of diagnosis of TMD. The functional occlusion was evaluated by asking the patient to perform lateral mandibular movements, in order to detect occlusal interferences in the non-working side, using a cellophane paper. The discrepancies between centric relation and intercuspal position were also registered by means of the mental pressure technique. When large discrepancies were detected (deviation greater than 4 mm) or the results were uncertain, the individuals were excluded. Also, the presence of lateral and anterior guides was required to consider the patient as “duly rehabilitated”. The individuals who were toothless and not duly rehabilitated by prostheses (prostheses without functional occlusion) were excluded from the study. Additionally, there was a concern about the level of education of the individuals sampled. To participate in the study, the elderly should be able to read, interpret and answer autonomously the questionnaire after a general explanation conducted by examiners.

Only one previously calibrated examiner performed all the evaluations of this research. Towards the end of the training, the calibration of the examiner was verified through Kappa's test⁽²⁰⁾, wherein the results of both evaluations were taken into account, in a same group of 20 elderly subjects, and substantial agreement was obtained (kappa: 0.71)⁽²¹⁾.

The selected elderly were interviewed by means of a questionnaire with information on their general health condition, on signs and symptoms of TMD, and on occlusion aspects.

The questionnaire⁽²²⁾ was applied to patients with no interference by the examiner, so as not to create expectations, and leading, thus, to a possible deviation from the clinical examination to be accomplished. The patients answered ten questions related to TMD symptoms, which afforded a classification of each subject regarding the presence and severity of such dysfunctions.

Anamnestic questionnaire:

1. Do you have difficulty in opening your mouth?
2. Do you have difficulty in moving your jaw sideways?
3. Do you feel discomfort or muscular pain when chewing?
4. Do you often have headaches?
5. Do you feel pain in your neck and/or shoulders?
6. Do you feel earaches or pain near your ears?
7. Do you notice any noise in your TMJ?
8. Do you regard your bite “normal”?
9. Do you use only one side of your mouth to chew?
10. Do you feel any pain in your face when you wake up?

Three options of response were offered for the anamnestic questionnaire: “yes”, “no”, or “sometimes”. Value “2” was attributed to every answer indicating the presence of the symptom; value “0”, for the absence thereof; and value “1”, for the “sometimes” answer. The total sum of the values obtained allowed the classification of the sample as regards TMD, as a TMD index.

- Values of 0 to 3: free of TMD
- Values of 4 to 8: mild TMD
- Values of 9 to 14: moderate TMD
- Values of 15 to 23: severe TMD

The evaluation of the presence of TMJ symptoms was accomplished first by orienting patients as to the difference between pressure and discomfort, to ensure more trustworthiness to their answers. This exam was performed through bilateral digital palpation with the examiner’s pointer fingers placed 10 to 20 mm before the external auditory conduct. The lateral aspect of the TMJ was palpated with patients keeping their mouths closed, and the posterior aspect was palpated with open-mouthed patients. These regions were pressed upon delicate and continuously, with approximately 450 to 900 kgf⁽²³⁾.

For the exam of muscular palpation, patients were given the same orientations in order to differentiate pain from discomfort. Palpation of masticatory muscles anterior, medial and posterior temporal; origin, body and insertion of superficial masseter; deep masseter was carried out with bilateral digital pressure, with constant pressure of 1,500 kgf⁽⁶⁾. The presence of pain was checked through the eyelid reflex and/or by questioning patients. Cervical muscles posterior digastric muscle, sternocleidomastoid, and superior trapezius were palpated by clipping one’s fingers like pincers on both sides.

The presence of joint noises based on right and left TMJ inspection was also evaluated. This evaluation was carried out by placing the pointer fingers lightly upon the region corresponding to the lateral pole of the condyle, facing the external acoustic meatus, while the patient performed movements of mandibular opening and closing.

The results obtained were statistically evaluated with the Statistical Package for the Social Sciences (SPSS) program, version 15.0, through a descriptive analysis, in addition to χ^2 test and the Tendency test. A 95% confidence interval and a 5% significance level were established for all the used tests.

RESULTS

The main characteristics of the studied population are shown in Table 1. No significant association between the severity of the TMD and the age range occurred, although a tendency for TMD to diminish with age was in fact observed ($A=-10.9$, and $p=0.008$), and an absence of moderate and severe TMD in elderly subjects over 80 years of age was also verified (Table 1).

The presence of TMD was observed in 61% of the sample, 43.5% being regarded as mild, 13% as moderate, and 4.5% as severe (Table 1). When observing the prevalence of TMD between genders, 72.4% of the women and 41.1% of the men had such a dysfunction, showing, thus, a significant association

between TMD severity and the female gender ($\chi^2=23.49$, and $p<0.0001$, Table 2).

Regarding TMJ palpation, 67.2% had painful sensitivity and TMD. A significant association, therefore, between TMJ pain to palpation and TMD severity was ascertained ($\chi^2=10.21$, and $p=0.0168$, Table 3). Regarding muscular palpation, 78.1% showed sensitivity to palpation of masticatory muscles and TMD, with at least three sites of pain, and 77.2% to that of cervical muscles. In addition, an association was found between TMD and tenderness to palpation of masticatory muscles ($\chi^2=22.31$, and $p<0.0001$, Table 3) and of cervical muscles ($\chi^2=27.95$, and $p=0.0001$, Table 3), with increased severity of the TMD.

Another aspect observed was a significant association between the frequency of headaches and the presence of TMD – wherein cases of mild and moderate severity were grouped together, alongside another group of severe TMD ($\chi^2=37.38$, and $p=0.0001$, Table 4).

The presence of joint noises, such as snaps or clicks and crepitations, was determined in 71.2% of the elderly subjects with TMD, while 28.8% of the patients evaluated proved free of such signals (Table 5). The association between the presence of joint noises and sensitivity to TMJ palpation was not significant ($\chi^2=0.002$, and $p=0.90$).

DISCUSSION

The high prevalence of TMD among elderly patients in this study corroborates other studies using a similar methodology^(10,24). Nonetheless, only part of the individuals had greater severity. The data of prevalence agrees with other study⁽²⁵⁾, wherein a lower percentage of individuals with moderate and severe TMD was observed.

Table 1. Distribution of the presence and severity of Temporomandibular Disorders in relation to age range

TMD	Age range (years)*			Total n (%)
	60–69 n (%)	70–80 n (%)	>80 n (%)	
Free	40 (33.1)	30 (44.1)	8 (72.7)	78 (39.0)
Mild	58 (47.9)	26 (38.2)	3 (27.3)	87 (43.5)
Moderate	19 (15.7)	7 (10.3)	0 (0)	26 (13.0)
Severe	4 (3.3)	5 (7.4)	0 (0)	9 (4.5)
Total	121 (100.0)	68 (100.0)	11 (100.0)	200 (100.0)

*Statistically different; $A=-10.9$; $p=0.008$

Caption: TMD = Temporomandibular Disorders

Table 2. Distribution of Temporomandibular Disorders presence in relation to gender

TMD	Gender*		Total n (%)
	Female n (%)	Male n (%)	
Free	35 (27.6)	43 (58.9)	78 (39.0)
Mild	61 (48.0)	26 (35.6)	87 (43.5)
Moderate	22 (17.3)	4 (5.5)	26 (13.0)
Severe	9 (7.1)	0 (0)	9 (4.5)
Total	127 (100.0)	73 (100.0)	200 (100.0)

*Statistically different; $\chi^2=23.49$; $p<0.0001$

Caption: TMD = Temporomandibular Disorders

Table 3. Distribution of severity of Temporomandibular Disorders in relation to the presence of pain when palpating the temporomandibular joint, the masticatory and cervical muscles

TMD	TMJ palpation	Palpation of masticatory muscles	Palpation of cervical muscles	Total
	n (%)	n (%)	n (%)	
		Painless		
Free	30 (55.6)	60 (41.5)	56 (53.8)	78 (39.0)
Mild	20 (37.0)	44 (33.3)	40 (38.5)	87 (43.5)
Moderate	3 (5.6)	13 (18.0)	8 (7.7)	26 (13.0)
Severe	1 (1.9)	1 (7.2)	0 (0)	9 (4.5)
Total	54 (100.0)	118 (100.0)	104 (100.0)	200 (100.0)
		Painful		
Free	48 (32.8)	18 (22.0)	22 (22.9)	78 (39.0)
Mild	67 (45.9)	43 (52.4)	47 (49.0)	87 (43.5)
Moderate	23 (15.8)	13 (15.9)	18 (18.8)	26 (13.0)
Severe	8 (5.5)	8 (9.8)	9 (9.4)	9 (4.5)
Total	146 (100.0)	82 (100.0)	96 (100.0)	200 (100.0)
p-value	0.02*	0.001*	0.001*	

*Statistically significant; χ^2 test**Caption:** TMD = Temporomandibular Disorders; TMJ = temporomandibular joint**Table 4.** Distribution of Temporomandibular Disorders severity in relation to frequency of headaches

TMD	Headaches*		Total
	Absent	Present	
	n (%)	n (%)	n (%)
Free	66 (52.8)	13 (16.9)	78 (39.0)
Mild	48 (39.0)	39 (50.6)	87 (43.5)
Moderate	10 (8.1)	16 (20.8)	26 (13.0)
Severe	0 (0)	9 (11.7)	9 (4.5)
Total	123 (100.0)	77 (100.0)	200 (100.0)

*Statistically significant; $\chi^2=37.38$; $p=0.0001$ **Caption:** TMD = Temporomandibular Disorders**Table 5.** Distribution of Temporomandibular Disorders presence in relation to joint noises

TMD	Joint noise		Total
	No	Yes	
	n (%)	n (%)	n (%)
Absent	39 (29.1)	19 (28.8)	58 (29.0)
Present	95 (70.9)	47 (71.2)	142 (71.0)
Total	134 (100.0)	66 (100.0)	200 (100.0)

 $\chi^2=0.002$; $p=0.90$ **Caption:** TMD = Temporomandibular Disorders

The anamnestic indexes, such as the one used in this research, are recommended in population-based studies because clinical examination for TMD diagnosis in large samples is difficult to achieve^(6,26).

The tendency for the signs and symptoms of TMD to decrease with age was ascertained in the present study, agreeing with another study which compared two groups (adults *versus* elderly)⁽¹³⁾. Higher sensitivity to pain in the young group has been previously noticed⁽¹³⁾, as compared to a small percentage in the elderly one.

The significantly higher prevalence for the female gender was also reported in other studies^(4-6,8,12,27). Likewise, it was also reported a correlation between individuals of different age ranges (between 35 and 74 years of age) and gender⁽⁵⁾. On the other hand, there are reports of no difference between genders⁽¹¹⁾. Few probable causes for the higher prevalence of pain in the female gender may be explained based on gender differences concerning mechanisms of pain and the craniofacial system. Otherwise, psychosocial differences, hormonal, and environmental factors may also play a role in this scenario⁽²⁷⁾.

The association between the presence of TMD and palpation of the TMJ, of masticatory, and cervical muscles observed in this study is similar to that verified in other studies^(10,12), despite the lack of association presented in the literature⁽⁵⁾. These contrasting results as to the estimation of painful symptoms may be related to the subjective aspect of pain. Interpretation of the painful stimulus to palpation and the exertion of proper pressure in the right location contribute to different findings^(6,24). The association between TMD and palpation of the TMJ may be important for health professionals concerned with alterations caused by these disorders, such as audiologists and speech therapists.

Regarding headaches, these are commonly cited as one of the most frequent symptoms in patients with TMD⁽²⁶⁾. A significant association between TMD and headaches was reported in a group in the age range from 20 to 59 years⁽¹²⁾. It is worth mentioning, however, that not all of the headaches reported by the individuals in a study are caused exclusively by facial muscle disorders. Other causes, such as migraines, and pain secondary to pathologies, may be mistaken by patients and, thus, increase the incidence of pain associated to TMD.

The presence of joint noises in several patients of this sample is in accordance with another study⁽²⁸⁾. Considering only crepitation, a divergence exists as to other studies in literature^(10,13,24), since they observed a greater prevalence of this sign in elder patients. Another study⁽¹³⁾ reported a greater prevalence of crepitation for the elderly group and no crepitation was observed at the group of young patients. This difference may be explained due to the difficulty in identifying joint noises, for, as opposed to this study, some research works used a stethoscope and computerized electrovibratography to evaluate this sign, for the sake of an easier detection.

It is also important to discuss some dental occlusion aspects, such as the high rate of natural tooth loss, since 87.5% of the elderly had lost more than ten teeth. This high tooth loss rate was also observed in other studies with elderly^(12,13). Despite the large number of missing natural teeth in the present study, there was no significant correlation between this data and the severity of TMD ($p<0.05\%$). This result can be explained because currently the etiology of TMD is considered less related to occlusal conditions and more related to psychosocial factors⁽²⁹⁾, or by the fact that all individuals enrolled were duly rehabilitated with prostheses for at least one year before the beginning of the study.

One limitation of this study was that, despite TMD are also related to vertigo and tinnitus⁽³⁰⁾, these signs and symptoms were

not assessed in this research. Therefore, further studies should be performed in order to analyze the correlation between the prevalence of TMD and these otological complaints, which are frequent in elderly and in speech-language assessment.

Since the signs and symptoms of TMD generally do not progress to a deterioration of the masticatory function and to the presence of pain, and for the fact that they seem to diminish with the advancement of age, the elderly, most of the times, do not notice that the signs and symptoms they have are related to TMD⁽³⁾. Thus, it is important to carry out educational programs in order to inform this population about TMD characteristics, allowing thus the population to seek the most appropriate treatment.

CONCLUSION

The elderly under study showed a high prevalence of TMD, especially in the female gender. Additionally, TMD observed were mainly of a mild degree and related to TMJ palpation and to that of masticatory and cervical muscles. Taking into account the high prevalence of signs and symptoms of TMD in the population under study, the accomplishment of a detailed clinical examination to investigate the presence of such disorders is essential and must not be neglected during the treatment of elderly patients.

**JGDDC was responsible for gathering, tabulation and analysis of the data and collaborated on the writing of the article; PVPO was responsible for the project during its design, execution and article elaboration; RLN collaborated on the data gathering and article writing; ACCFC collaborated on article writing; MRAC collaborated on data gathering; LLMM participated in the data gathering and collaborated on the article writing; KBPF supervised data gathering and collaborated on the analysis of the results and article writing.*

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