Factors associated with temporomandibular dysfunction in the elderly: an integrative literature review

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Abstract

Objective: To identify the factors associated with temporomandibular dysfunction among elderly persons. *Method:* An integrative literature review was carried out, evaluated by scientific publications indexed in five databases: MEDLINE/PubMed, SCOPUS, WEB OF SCIENCE, CINAHL and LILACS, without date or language restrictions. The adapted Newcastle-Ottawa Scale was used to evaluate the articles. *Results:* Of the 888 articles from the databases, four were considered eligible for this review. Risk of bias analysis classified one article as low risk and the other as intermediate risk. *Conclusion:* The factors associated with temporomandibular dysfunction in the elderly indicated by the studies were: female gender, age between 60-70 years, a low income, suffering from tinnitus, dizziness, depression, headache or bruxism; experience temporomandibular joint palpation, masticatory and cervical muscle pain, a low number of teeth and the use of complete dentures.

Keywords:
Temporomandibular Joint Disorders. Elderly. Aged, 80 and Over.

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INTRODUCTION

The population segment aged 60 years and older is growing rapidly in relation to other age groups, with some 962 million people aged 60 or above, representing 13% of the total population. According to World Population Prospects: 2017 Revision, the global population reached almost 7.6 billion by the middle of 2017, and the number of elderly people in the world is projected to be 1.4 billion by 2030, 2.1 billion in 2050, and 3.1 billion in 2100[1]. Unlike the other regions of the world, Africa is in the early stages of demographic transition and has high fertility rates, with its population structure made up of more young people. Less than 5% of the total population of the vast majority of African countries is aged 65 and above, and in 21 countries this group represents 3% of the population or less, including Ethiopia (2.9%) and Uganda (2%)[2].

Although aging is a natural process, changes in the human body due to advancing age involve systemic, physiological and/or anatomical characteristics and influence the presence or absence of diseases. Health-related factors also emerge from the lifestyle of each individual and play an important role in planning care for such individuals[3].

The limitations found in aging occur, on average, in the group aged between 50 and 60 years, at which point the decline of functional motor units begins, combined with atrophy of the body tissues. Functional alterations also involve the oral cavity region, which presents disorders such as loss of mucosal elasticity and changes in the underlying and supporting tissues, muscular and bone structures. In this region there is an increase in the connective and adipose tissue in the tongue, a reduction in the number of teeth, as well as gustatory limitations and a reduction in taste, leading to a decline in the quality of life of the elderly[4-6].

Temporomandibular joint dysfunction (TMD) may include disorders related to the temporomandibular joint (TMJ) or the musculoskeletal structures, characterized by pain or discomfort in the TMJ or both. It is the main cause of non-dental pain in the orofacial region, and may lead to the restriction of mandibular movement, increased muscle tension, and grinding, affecting the quality of life of the individual[7]. Furthermore, functional overload in the TMJ can occur during aging, caused by the failure to replace missing teeth, parafunctional habits, poor occlusion or even trauma/disorders[8].

With such disorders in the oral cavity, it is pertinent to suggest that the elderly can suffer from TMD. The data available on this condition are conflicting, however. While some studies indicate that it may be present[9] or rare[10,11] among the elderly, other studies report that the elderly in general may suffer from TMD[12].

In view of the above, the objective of the present study was to conduct a survey of scientific literature in order to identify the factors associated with temporomandibular joint dysfunction in elderly persons.

METHOD

A descriptive, integrative review type study was performed[13]. Six methodological steps were applied: 1) establishing of the research question; 2) literature search; 3) data evaluation; 4) categorization of studies; 5) interpretation of results and integration of data; and 6) presentation of the integrative review. The following guiding question was used: "What factors are associated with temporomandibular dysfunction in elderly persons?".

The search for scientific articles was carried out in October 2017 and the following databases were accessed: MEDLINE/PubMed (Medical Literature Analysis and Retrieval System Online), SCOPUS (Bibliographic Database), WEB OF SCIENCE (Bibliographic Database) CINAHL (The Cumulative Index to Nursing and Allied Health Literature) and LILACS (Latin American and Caribbean Literature in Health Sciences). No language or date restrictions were applied in order to increase the sensitivity of the search. The search strategies used to locate the articles in each database are described in Chart 1. Where applicable, descriptors of the MeSH (Medical Subject Headings) and DeCS (Health Science Descriptors) were used.

Chart 1. Database search strategies used. Recife, PE, 2018.

DATABASE	SEARCH STRATEGY
MEDLINE/PubMed	((*"temporomandibular joint disorders"[MeSH Terms] OR* ("temporomandibular"[*All Fields] AND "joint"[All Fields] AND "disorders"[All Fields]) OR "temporomandibular joint disorders"[All Fields]) AND ("aged"[MeSH Terms] OR "aged"[All Fields])) AND ("aged, 80 and over"[MeSH Terms] OR "80 and over aged"[All Fields] OR "aged, 80 and over"[All Fields])*
SCOPUS	*(TITLE-ABS-KEY (temporomandibular AND joint AND disorders) AND TITLE-ABS-KEY (aged) AND TITLE-ABS-KEY (aged, 80 AND over))*
WEB OF SCIENCE	*(temporomandibular joint disorders) AND (aged) AND (aged, 80 and over)*
CINAHL	*temporomandibular joint disorders AND aged AND (aged, 80 and over)*
LILACS	*transtornos da articulação temporomandibular* (temporomandibular joint disorders) [Words] *AND idoso* (elderly person) [Words] *AND idoso de 80 anos ou mais* (elderly person aged 80 or older)[Words]

The review included scientific studies evaluating the factors associated with TMD in the elderly (60 years or older). Literature review articles and two articles written in Chinese and Japanese that were not available in full were excluded.

The selection of the studies was carried out in two stages: reading of the titles/abstracts and subsequent complete reading of the selected papers. The first stage was carried out independently by two investigators, based on the inclusion and exclusion criteria, classifying the potentially eligible studies and disregarding the duplicates. In the second stage, the selected articles were read in full and divergences during selection were resolved through a consensus meeting between the researchers.

Data collection was carried out using a data extraction form, created specifically for this review, containing the following items: author, year, country, sample size, gender, objective, assessment instruments and variables associated with TMD (Chart 2). Using the extracted data, analysis of the risk of bias of the articles was performed using the adapted version of The Newcastle-Ottawa Scale (NOS) for cross-sectional studies[14-15]. The NOS scale evaluates the methodological quality of a study in terms of the selection of study groups, comparability between groups and outcomes. For each scale item, a high quality is represented by a star, while low quality is shown without a star.

RESULTS

The search in the selected databases resulted in the identification of 888 articles with the potential for inclusion in this integrative review, of which 400 were duplicates and were subsequently disregarded. Of the remaining 488 articles, 16 were read in full. Of these, 12 did not meet the eligibility criteria and were excluded. Finally, four papers[17-20] were selected to compose the present review. The steps comprising the process of selection of the studies are shown in the flowchart proposed by PRISMA[16] (Figure 1).

Of the four articles included[17-20], two involved special populations (institutionalized individuals) and all were cross-sectional studies. Two were carried out in Brazil, one in Sweden and the other in the United States. The sample size of the studies ranged from 117 to 8,619 elderly people of both genders, aged 60 to 94 years, and the year of publication ranged from 1990 to 2016 (Chart 2).

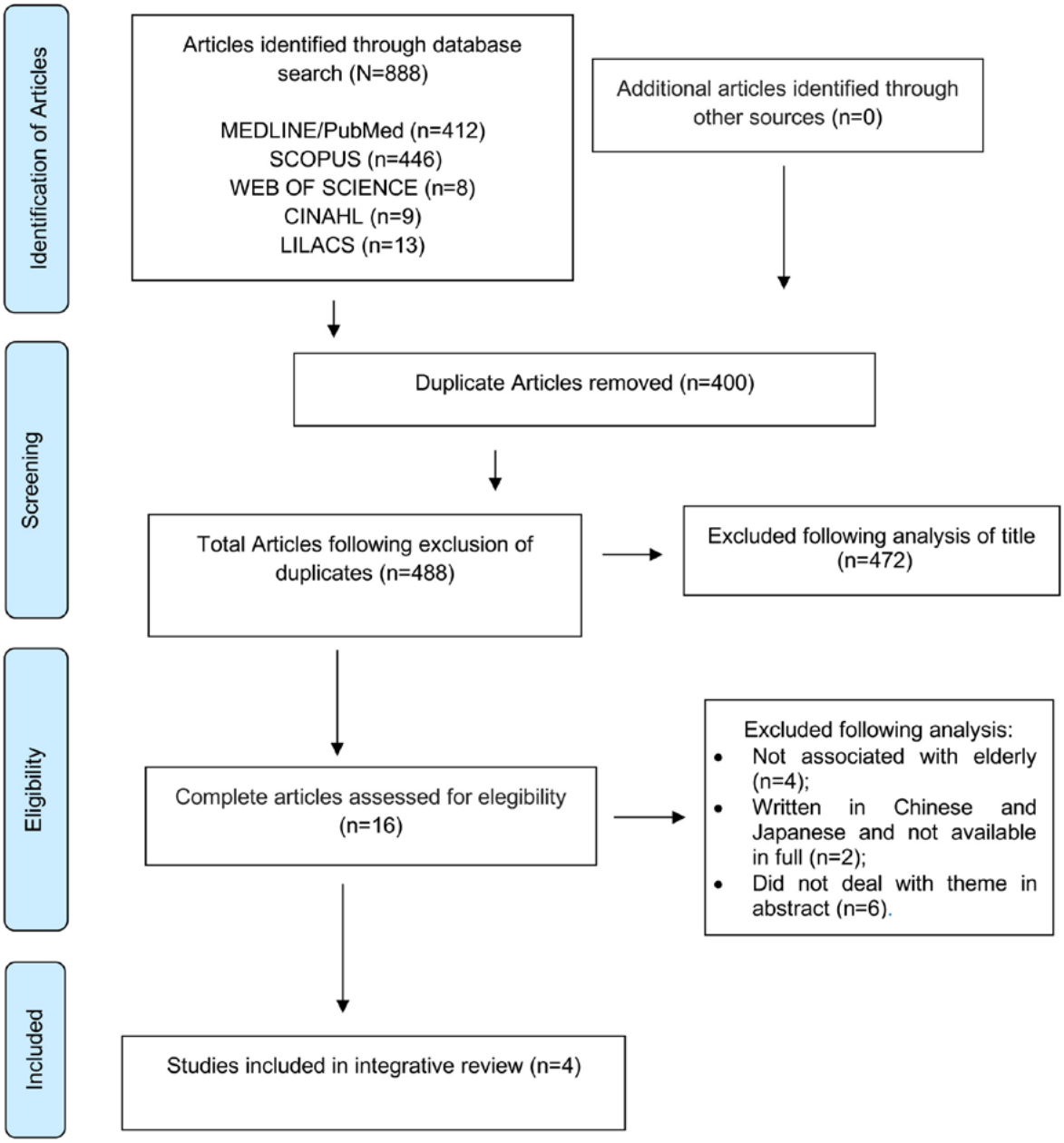

Figure 1. Flowchart of stages of selection process of articles in accordance with PRISMA. Recife, PE, 2018.

Chart 2. Overall characteristics of articles included in the review. Recife, PE, 2018.

Author, year, country	Sample size and gender	Objective	Assessment Instruments	Variables associated with TMD
Sampaio et al., 2016, Brazil[17]	307 Elderly persons of both genders.	To determine the factors associated with TMD in institutionalized and non-institutionalized elderly persons.	Fonseca anamnestic index (FAI).	TMD in 50.5% of the sample. Non-institutionalized (49.8%) and institutionalized individuals (52.5%). Prevalence of TMD, with statistical significance for women, aged 60-70 years, with a low income, presence of tinnitus, dizziness and depression.
Camacho et al., 2013, Brazil[18]	200 Elderly persons of both genders.	To investigate the prevalence of TMD in the elderly and association with palpation of the TMJ and the masticatory and cervical muscles, as well as the presence of headaches and joint noises.	Anamnestic questionnaire, evaluation of TMJ and muscular examination.	TMD in 61% of the sample. Higher among women (72.4%). Significant association between severity of TMD and palpation of the TMJ ($p = 0.0168$), the masticatory muscles ($p < 0.0001$) and the cervical muscles ($p < 0.0001$). Headaches and TMD present.
Carlsson et al., 2014, Sweden[19]	8619 Elderly persons of both genders.	To assess the prevalence of TMD-related symptoms in two population samples, aged 70 and 80 years in two Swedish counties.	Questionnaire with 53 questions. Prepared by the researcher.	TMD in 34% of the sample. Among those aged 70, the prevalence was 12% of women and 7% of men. Among those aged 80 years, the prevalence was 8% and 7%. Bruxism was associated with TMD.
Harriman et al., 1990, USA[20]	117 Elderly women.	To examine the association between TMD and age, education, mental status, physical functions, arthritis and dental health in an elderly population.	Pfeiffer's Mental State Questionnaire. Williams test. Pre-structured questionnaire created by the authors. The diagnostic criteria for signs and symptoms of TMJ developed by Fricton and Schiffman were used (cracking, locking, opening, lateral deviation, crepitus and coarse crepitus).	TMD in 22% of the sample. Associated with the presence of complete dentures ($p = 0.05$) and the absence of posterior teeth.

Key: TMD: Temporomandibular Disorder; TMJ: Temporomandibular Joint.

All articles were written in English and presented the following risk of bias scores according to the NOS scale: one with seven stars[19], indicating a low risk of bias, and the remainder with five stars[17,18,20], representing an intermediate risk. The results of the risk of bias analysis are shown in Chart 3.

Chart 3. Risk of bias analysis based on The Newcastle-Ottawa Scale (NOS) for cross-sectional studies (adapted)[14]. Recife, PE, 2018.

	SELECTION				COMPARABILITY	RESULTS	
	Sample representativeness	Sample size	Non-respondents	Instrument	Confounding Factors controlled	Assessment of results	Statistical Test
Sampaio et al., 2016, Brazil[17]			NR	**	*	*	*
Camacho et al., 2013, Brazil[18]			NR	**	*	*	*
Carlsson et al., 2014, Sweden[19]	*	*	*	*	*	*	*
Harriman et al., 1990, USA[20]			NR	**	*	*	*

Scoring: Selection – Up to five stars; Comparability – Up to one star; Result – Up to three stars. Key: NR – Not reported *by researcher.*

In the evaluation of the methodological quality of the articles based on selection, only the Swedish study reported the representativeness of the sample through random sampling, and a comparison was made between respondents to the questionnaires and non-respondents. The other three studies had a selected group of users (self-reported information), did not describe the sample calculation and did not report the non-response rate.

Regarding comparability and results, the four studies were presented in a similar manner, with control for additional factors, self-reported results and a statistical test for analysis of the described and appropriate data (with confidence intervals and *p* value). The main factors associated with TMD in the elderly persons identified in this review were: being female, age 60-70 years, low income, suffering from tinnitus, dizziness, depression, headache or bruxism, TMJ palpation pain and pain in the masticatory and cervical muscles, a reduced number of teeth and the use of complete dentures.

DISCUSSION

The aging process often brings with it changes that affect both general and oral health, and which become part of the functional decline of the individual due to chronic and behavioral conditions related to time and health[21].

When the signs and symptoms of TMD described in the studies studied were analyzed, no consensus of results was found among the authors[17-20]. One study reported an association between the severity of the disease and the presence of pain related to TMJ palpation, headaches and pain in the masticatory and cervical muscles[18]. Others related TMD to bruxism[19], the absence of the posterior teeth and the use of complete dentures[20], and ontological factors such as tinnitus and dizziness, as well as depression[17]. Although these signs and symptoms are frequent in patients with TMD, they cannot be considered diagnostic symptoms, as they can also be found in individuals who do not suffer from the disease[22].

There was a higher prevalence of TMD among women[17-20], a finding that agrees with the results of other studies[23,24], with women affected more frequently. Emotional factors[25], hormonal changes (menopause)[26] and anatomical disorders, related to poor posture of the occipital condyles, TMJ anterior disc displacement and ligament laxity are factors indicated as possible explanations[27,28].

The conditions of social inequalities of a population reflect a differentiation in the epidemiological profiles when different groups are observed. Thus, the socioeconomic, cultural and environmental conditions of a population generate a stratification of individuals and population groups, with different social positions that are directly related to health conditions. These disparities are expressed through income, education and social class, representing social inequalities[29]. With the objective of determining which sociodemographic factors were associated with TMD in the elderly, Sampaio et al.[17] analyzed the prevalence of this disorder among different educational levels and observed that non-institutionalized elderly individuals who studied up to elementary school only had a prevalence of TMD of 62.7%.

Sampaio et al.[17], 307 elderly people of both genders, 80 of whom were institutionalized and 227 of whom were non-institutionalized. The overall prevalence of TMD was 50.5%, while among non-institutionalized elderly persons it was 49.8% and among institutionalized elderly persons it was 52.5%. Among the non-institutionalized elderly, there was a higher prevalence of TMD in those aged 60-70 years (59.5%), those with a low income (100%), and those with tinnitus (64.4%), dizziness (68.4%) and depression (67.2%)[17]. These data corroborate with other studies that described tinnitus and dizziness as common symptoms among the elderly[30,31], as well as among individuals with TMD[32,33]. They differ from a study carried out with elderly institutionalized women in Minnesota[20], which found no association between the severity of TMD and age group and observed a tendency for the symptoms of the disease to decrease with increasing age, becoming completely absent in those aged over 80 years.

In the study by Carlsson et al.[19] it was found that being elderly and suffering from bruxism can increase the odds of developing TMD three to six fold. Bruxism is a rhythmic attrition of the non-chewing movement of the teeth and jaw. It is related to parafunctional activities and may occur when

the individual is asleep or during the day. It can be associated with dental tightening, biting of the lip, cheek or other objects, thumb or finger sucking, improper posture habits, as well as other habits that individuals perform, mostly unconsciously[34].

The loss of teeth or edentulism can alter the mechanics and pressure in the mouth, and thus cause a mechanical overload of the TMJ, leading to clinical disorders[35,36]. This finding was observed in the study by Harriman et al.[20] who verified that the absence of posterior teeth and the use of complete dentures influenced the presence of TMD. This result disagrees with the study by Ribeiro et al.[37] in which no association was found between the use of dentures and TMD.

Depression was the strongest predictor associated with the prevalence of TMD[17]. In many studies, psychological factors are indicated as etiologic for TMD, however, little is known about the relationship between TMD and the neurophysiological etiology of depression[38,39]. For institutionalized individuals, the prevalence of TMD among those with depression was 72.2%[17], representing an increase in comparison with those without depression (67.2%).

There was divergence between the selected studies in terms of sample size. Most of the studies did not perform sample calculations, which may limit the interpretation and generalization of the results and the conclusion of this review. Only one study reported on the cognitive assessment test used prior to data collection with the elderly[20]. None analyzed the issue of swallowing and the nutritional status of those interviewed with TMD. In addition, the samples were selected for convenience, in a non-random manner and identified in a specific health service[17,18,20], which may generate selection bias. The present review found that several instruments were used to evaluate TMD, and the studies included used validated measurement tools or those described by the authors. There was no report of a specific instrument adapted for elderly people in the articles analyzed, however, which may reflect a calibration bias and interfere with the results obtained.

CONCLUSION

The present integrative review revealed that the main factors associated with temporomandibular dysfunction in the elderly were: female, 60-70 years old, low income, suffering from tinnitus, dizziness, depression, headache or bruxism, having pain related to palpation of the temporomandibular joint, the masticatory and the cervical muscles, a reduced number of teeth and using complete dentures.

The growing number of elderly persons has resulted in a high number of surveys aimed at this audience. Emotional and social factors and systemic pathologies can affect the elderly, and it is essential to understand the morphological and pathological disorders that may be associated with the same.

Understanding the health and well-being of the elderly is essential, not only for the elderly individuals themselves, but also for health professionals, in order to achieve the correct diagnosis and provide better care, and for the economic and social care systems. Such knowledge makes it possible to plan a range of health policies and services and to provide social support, subsequently improving the quality of life of the elderly.

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