# Etiology of Temporomandibular Disorders in Individuals Aged 60 and Over: A Systematic Review

# Etiologia das Disfunções temporomandibulares apresentadas por pessoas com idade igual ou superior a 60 anos: Uma revisão sistemática

# Etiología de las disfunciones temporomandibulares presentadas por personas de 60 años o más: Una revisión sistemática

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**RESUMO**

**Objetivo:** identificar os fatores etiológicos das DTM em idosos por meio de uma revisão sistemática. **Métodos:** Foram seguidas diretrizes metodológicas PRISMA, com seleção, extração e análise de dados realizadas por revisores independentes. **Resultados:** Dos 2129 trabalhos identificados, 381 foram excluídos por duplicidade. Após a aplicação dos critérios de seleção, 34 trabalhos foram considerados elegíveis, resultando em 11 artigos para a revisão. A análise revelou que 7 estudos associaram o sexo feminino à maior prevalência de DTM, enquanto 6 estudos destacaram a perda dentária e o suporte oclusal deficiente como fatores relevantes. Alterações articulares degenerativas foram mencionadas em 5 estudos, e fatores musculares e parafuncionais em 4 estudos. Dois estudos abordaram a influência de fatores psicossociais e comorbidades sistêmicas. **Conclusão:** A etiologia das DTM em idosos é multifatorial, envolvendo alterações senis, hábitos parafuncionais e condições sistêmicas, impactando a função da articulação temporomandibular. Este trabalho contribui para a geriatria ao integrar achados científicos sobre DTM.

**Descritores**: Disfunção Temporomandibular; Idosos; Etiologia. Odontologia geriátrica.

**ABSTRACT**

**Objective:** to identify the etiological factors of TMD in the elderly through a systematic review. **Methods**: PRISMA methodological guidelines were followed, with selection, data extraction, and analysis carried out by independent reviewers. **Results**: Of the 2129 studies identified, 381 were excluded due to duplication. After applying the selection criteria, 34 studies were considered eligible, resulting in 11 articles for the review. The analysis revealed that 7 studies associated female gender with a higher prevalence of TMD, while 6 studies highlighted tooth loss and deficient occlusal support as relevant factors. Degenerative joint changes were mentioned in 5 studies, and muscular and parafunctional factors in 4 studies. Two studies addressed the influence of psychosocial factors and systemic comorbidities. **Conclusion**: The etiology of TMD in the elderly is multifactorial, involving senile changes, parafunctional habits, and systemic conditions, impacting the function of the temporomandibular joint. This work contributes to geriatrics by integrating scientific findings on TMD.

**Descriptors**: Temporomandibular Dysfunction; Elderly; Etiology. Geriatric Dentistry.

**RESUMEN**

**Objetive**: identificar los factores etiológicos de las TMD en ancianos mediante una revisión sistemática. **Métodos**: Se siguieron las directrices metodológicas PRISMA, con selección, extracción y análisis de datos realizados por revisores independientes. **Resultados**: De los 2129 trabajos identificados, 381 fueron excluidos por duplicidad. Tras la aplicación de los criterios de selección, 34 trabajos fueron considerados elegibles, resultando en 11 artículos para la revisión. El análisis reveló que 7 estudios asociaron el sexo femenino con una mayor prevalencia de TMD, mientras que 6 estudios destacaron la pérdida dentaria y el soporte oclusal deficiente como factores relevantes. Alteraciones articulares degenerativas fueron mencionadas en 5 estudios, y factores musculares y parafuncionales en 4 estudios. Dos estudios abordaron la influencia de factores psicosociales y comorbilidades sistémicas. **Conclusión:** La etiología de las DTM en personas mayores es multifactorial, involucrando cambios propios de la edad, hábitos parafuncionales y condiciones sistémicas, afectando la función de la articulación temporomandibular. Este trabajo contribuye a la geriatría al integrar hallazgos científicos sobre DTM.

**Descriptores**: Disfunción Temporomandibular; Personas mayores; Etiología. Odontología geriátrica.

REVIEW

## Introduction

The process of senescence generates various changes in human life (1). Studies related to this life stage are essential for the development of protocols, services, and public policies capable of ensuring the full and dignified enjoyment of life for the elderly (2). Senescence is a complex process involving different fields of knowledge, requiring interprofessional collaboration to maintain the quality of life of older adults (3).

Dentistry should contribute to the maintenance of the elderly as fully integrated members of society, as present, healthy individuals capable of contributing to community development (4). Therefore, oral health is essential for the proper maintenance of the stomatognathic system and for the social interaction of older adults with different social agents (5,6). Specifically, this study draws attention to changes related to the masticatory process, which is frequently influenced by alterations in the temporomandibular joint (TMJ) (7–9)

Temporomandibular disorders (TMD) can occur at any stage of life; however, understanding the factors leading to the development of this disorder is fundamental for successful treatment (10). The etiology of TMD should guide the therapeutic alternatives chosen by the professional implementing them (11–13). Thus, identifying the patient profile, such as age group, can accurately reduce the possible etiologies of TMD. Therefore, this review aims to identify the etiological factors of temporomandibular disorders in elderly patients through a systematic review.

## Method

### Protocol and Guidelines

This systematic review was conducted and reported in accordance with the PRISMA 2020 recommendations (14), which provide a 27-item checklist to ensure transparency and reproducibility in the conduct and reporting of systematic reviews. The review protocol was previously outlined based on the PICOS strategy (Population, Intervention/Exposure, Comparison, Outcomes, Study design) (15), widely used to structure research questions and search strategies in systematic reviews (Table 1). The guiding question for this review was: What are the etiological factors associated with temporomandibular disorders (TMD) in elderly individuals?

**Table 1. PICOS Criteria for the Systematic Review**

| Element | Description |
|---|---|
| P (Population) | Elderly (≥ 60 years) |
| I (Intervention/Exposure) | Etiological factors associated with temporomandibular disorders (TMD), including anatomical, pathophysiological, psychosocial, and traumatic factors |
| C (Comparizon) | Not applicable (observational and experimental studies without mandatory control group) |
| O (Outcome) | Identification and description of TMD etiological factors |
| S (Study type) | Observational (cross-sectional, case-control, cohort) and experimental studies |

For eligibility criteria, studies were included if found in the PubMed, Scopus, and BIREME databases. These databases provide complementary coverage: PubMed, maintained by the U.S. National Library of Medicine, is a major source of peer-reviewed biomedical literature, especially in medicine, dentistry, and health sciences. Scopus, by Elsevier, is a multidisciplinary database that includes scientific journals, conference proceedings, and technical literature, offering robust citation analysis and bibliometric tools. BIREME (Virtual Health Library) focuses on the dissemination of scientific information in Latin America and the Caribbean, encompassing databases such as LILACS and SciELO, allowing access to regional studies often not indexed in international databases.

Exclusion criteria were as follows:

1) studies with mixed populations (young and elderly) without age-stratified data;

2) studies addressing TMD in patients with specific conditions not representative of the general elderly population;

3) studies without socioeconomic characterization of the sample;

4) studies that did not report a diagnostic method for TMD;

5) studies that did not report etiological factors;

Searches were conducted in PubMed, BIREME, and Scopus from February 2025 to March 2025, without language or publication date restrictions. The search strategy was constructed based on the PICOS model, using controlled descriptors (MeSH, DeCS) and terms appropriate for each database, as shown in Table 2.

**Table 2.** Search Strategies by Database

| Database | Search Algorithm | Notes |
|---|---|---|
| PubMed | ("Temporomandibular Joint Disorders"[MeSH] OR "Temporomandibular Disorders" OR "TMD") AND ("Aged"[MeSH] OR elderly OR older adults) AND ("Etiology"[MeSH] OR "Risk Factors" OR "Causality") | Uses MeSH descriptors for more precise retrieval of biomedical articles. |
| Scopus | TITLE-ABS-KEY("Temporomandibular Disorders" OR "TMD") AND TITLE-ABS-KEY("elderly" OR "older adults") AND TITLE-ABS-KEY("etiology" OR "risk factors") | Search performed in title, abstract, and keywords fields using Boolean operators. |
| BIREME | ("Transtornos da Articulação Temporomandibular" OR "DTM") AND ("Idoso" OR "adulto mais velho") AND ("Etiologia" OR "Fatores de risco") | Uses DeCS descriptors and free terms in Portuguese and Spanish for regional coverage. |

The study selection was conducted in two main stages, using the Rayyan tool to optimize screening and ensure greater methodological rigor. Initially,

titles and abstracts were reviewed independently and blindly by three reviewers. Each reviewer assessed the records identified in the databases for relevance to the research question, applying the predefined inclusion and exclusion criteria. In cases of inconsistencies or disagreements among the reviewers, a fourth reviewer, with greater experience in the field, acted as a judge to make the final decision.

In the second stage, articles that met the criteria during the initial screening were subjected to full-text reading. This comprehensive analysis was conducted and discussed by all authors, ensuring consensus regarding the final eligibility of the included studies.

For the extraction of results, a standardized table was created in Microsoft 365 to collect the following information:

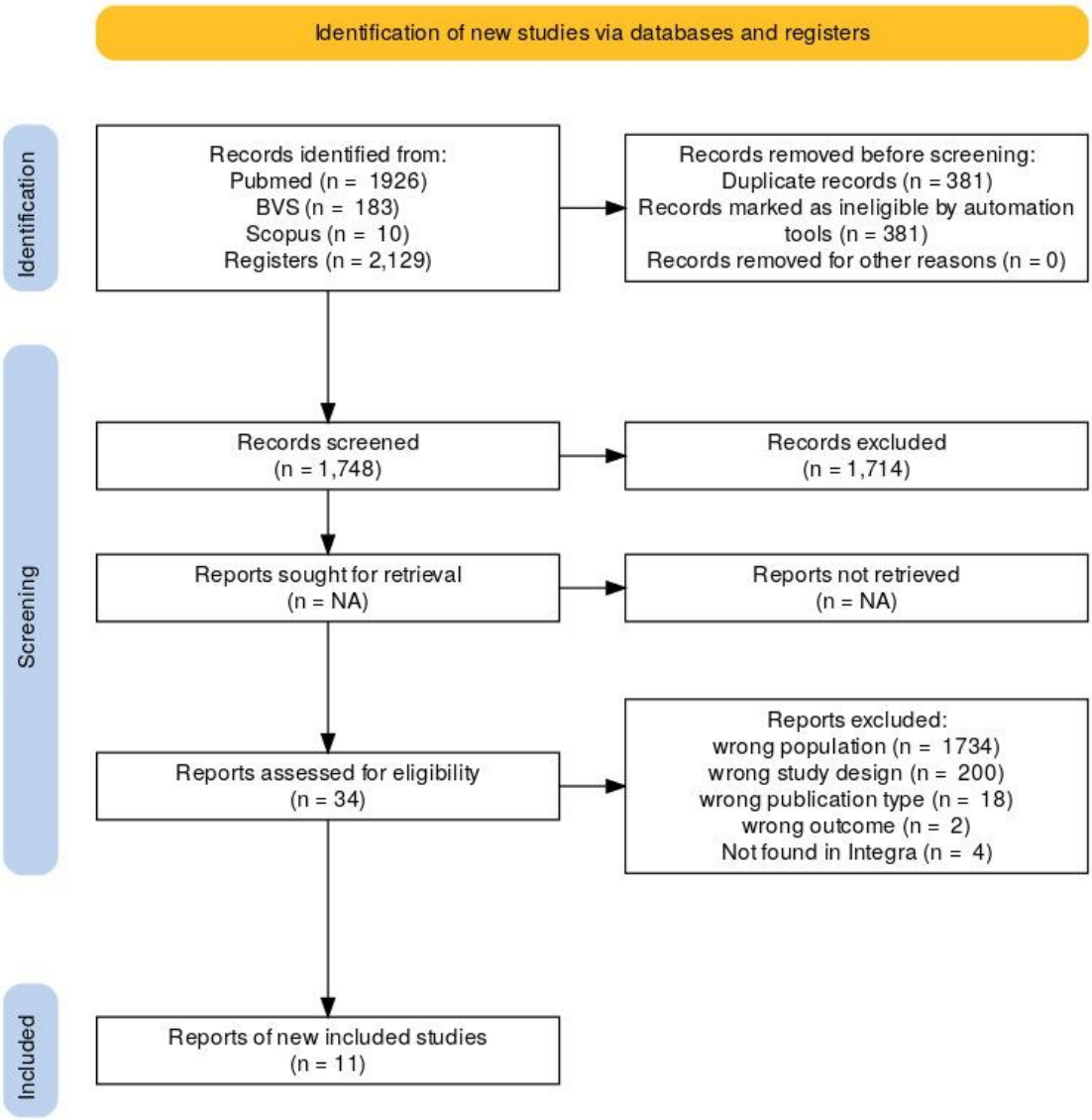
- Author, year, country
- Sample characteristics (mean age, sex, socioeconomic data)
- Diagnostic method for TMD
- Identified etiological factors (classified as traumatic, anatomical, pathophysiological, psychosocial)
- Study type

Due to expected heterogeneity, a narrative synthesis of the findings was chosen. The quality of the included studies was assessed considering risk of bias, methodological clarity, and completeness of data.

**Results**

A total of 2,129 records were identified in the PubMed (n = 1,926), BVS (n = 183), and Scopus (n = 10) databases. After removing 381 duplicates, 1,748 articles were screened by title and abstract, with 1,714 excluded for not meeting the eligibility criteria. Thirty-four articles were evaluated in full, of which 23 were excluded due to inappropriate population, incompatible methodological design, unsuitable publication type, incorrect outcome, or lack of access. In the end, 11 studies comprised the final sample. The selection process is illustrated in the PRISMA Flow Diagram (Figure 1).

**Figura 1.** PRISMA Flow Diagram




The 11 studies were published between 1994 and 2021, conducted in countries such as Brazil, Cuba, Vietnam, and Sweden, with sample sizes ranging from 114 to 1,646 elderly participants. The predominant study design was cross-sectional, and the diagnostic methods used included the Fonseca Anamnestic Index, the Modified Helkimo Index, RDC/TMD, DC/TMD, and clinical examinations supplemented by imaging methods. Details of each study are described in Table 1.

**Table 1.** Data Extraction Table (n=11).

| Authors | Year | Sample Size and Characteristics | DTM Diagnostic Tool | Associated/Influencing Factors | Etiology |
|---|---|---|---|---|---|
| Widmalm SE, et al. | 1994 | 248 TMJs from 224 fresh cadavers (mean age at death: 71.5 years for ♂, 73.6 years for ♀; range 33–94 years). | Macroscopic examination by dissection or cryosection. | Osteoarthritis and TMJ disc perforation. | Tooth loss and occlusal conditions. |
| Hiltunen K, et al, | 1997 | 364 elderly participants (76, 81, and 86 years) in a dental examination. Participation rates | Helkimo Anamnestic Dysfunction Index (Ai) and Clinical Dysfunction Index (Di); Occlusal status assessed by Eichner | No difference in DTM severity when comparing groups with and without removable dentures. DTM severity did not depend solely on dental | Pathophysiological bone changes, especially osteoporosis, leading to osteoarthritis and temporomandibular |

| | | | | |
|---|---|---|---|---|
| | of 69% for ♂ and 58% for ♀. | Index. | support zones. | joint degeneration. |
| Ikebe K, et al. 2008 | 1,646 independently living Japanese elderly (>60 years old; mean 66.6 ± 4.4 years; 827 ♂, 819 ♀). For occlusal force and masticatory performance, 912 randomly selected participants without TMJ pain were assessed. | Digital palpation used to identify TMJ pain and sounds (clicking and crepitation). Maximum mouth opening measured as the distance between incisal edges of central incisors, with <40 mm defined as limited opening. | TMJ sounds (even asymptomatic) were associated with lower occlusal force (OR = 3.20, p = 0.046) and lower masticatory performance (OR = 3.18, p = 0.041). Female sex was associated with a higher likelihood of TMJ sounds. | Biomechanical alterations such as occlusal force imbalance and impaired masticatory function causing joint sounds and symptoms. |

| | | | | | |
|---|---|---|---|---|---|
| Almagro Céspedes I, et al. | 2011 | 94 semi-institutionalized elderly (mean age 80.2 ± 7.8 years; 34 ♂, 60 ♀). | Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD); Helkimo Anamnestic Index. | Moderate-to-severe TMD was more frequent in women. Joint sounds (21.3%), muscle fatigue (26.6%), and TMJ pain (14.9%) were the most frequent manifestations associated with TMD. | Absence or inadequacy of occlusal support causing muscular and joint imbalances. |
| Divaris K, et al. | 2012 | 873 geriatric patients using complete dentures (mean age = 72 years; range 65–95 years). | Diagnosis based on any sign of TMD (binary variable: 1 = TMD, 0 = healthy). | Time since edentulism was strongly associated with TMD development (OR = 1.03 per year). Female sex was associated with higher odds of TMD (OR = 1.58). | Occlusal imbalance compromising mandibular function and leading to muscular and articular symptoms. |

| | | | | | |
|---|---|---|---|---|---|
| Macedo J, Doi M, et al. | 2014 | 197 idosos fisicamente independentes (média 68,89 ± 5,68 anos; 123 ♀, 74 ♂). | Avaliação odontológica da DTM (dor na ATM por palpação, palpação muscular mastigatória e cervical, ruídos articulares); Dor de ouvido verificada por histórico médico e anamnese audiológica. | Associação significativa (p = 0,036) entre DTM e dor de ouvido (otalgia) (odds ratio = 2,3). 40,9% dos idosos com queixa de dor de ouvido tinham DTM. | Condições musculares e articulares multifatoriais influenciadas por saúde bucal e função mandibular reduzida. |
| De Moraes Marchiori LL, et al. | 2014 | 199 physically independent elderly (mean age 68.89 ± 5.68 years; 123 ♀, 74 ♂). | Dental evaluation for TMD (TMJ pain by palpation, palpation of masticatory and cervical muscles, joint sounds); Ear pain | Significant association (p = 0.036) between TMD and ear pain (otalgia) (odds ratio = 2.3). 40.9% of elderly with ear pain complaints | Multifactorial muscular and articular conditions influenced by oral health and reduced |

| | | | | | |
|---|---|---|---|---|---|
| | | | assessed through medical history and audiological anamnesis. | had TMD. | mandibular function. |
| Bäck K, et al. | 2017 | 114 elderly men and women (75 or 80 years). 88 participants aged 80 (48 ♀, 40 ♂) for orofacial clinical examination. | Radiographic signs of OA/osteoarthritis in the TMJ (flattening, osteophytes, and condylar erosion via panoramic radiographs); Orofacial clinical examination according to Research Diagnostic Criteria, RDC/TMD (Axis I and part of Axis II); Gradual chronic pain | No association was found between clinical RDC/TMD diagnosis and osteopenia/osteoporosis. TMJ pain was associated with a maximum mouth opening <40 mm. | Neurophysiological and musculoskeletal components, involving vestibular-related symptoms associated with TMD. |

| | | | | | |
|---|---|---|---|---|---|
| | | | scale. | | |
| Nguyen et al. | MS, 2017 | 145 participants with TMD and 112 without TMD (control group), ages 65–74. Total sample: 257 (128 ♀, 129 ♂). | Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) Axis I. | Unilateral complete loss of occlusal units (OR = 3.4, P = 0.020) and bilateral complete loss of occlusal units (OR = 2.7, P = 0.027) were positively associated with TMD. The TMD group lost significantly more posterior teeth (mean 5.1 ± 4.7) than the control group (4.0 ± 3.9). Mandibular posterior tooth loss was significantly higher in the TMD group. | Tooth loss altering occlusal and functional balance of the masticatory system, favoring the development of TMD. |

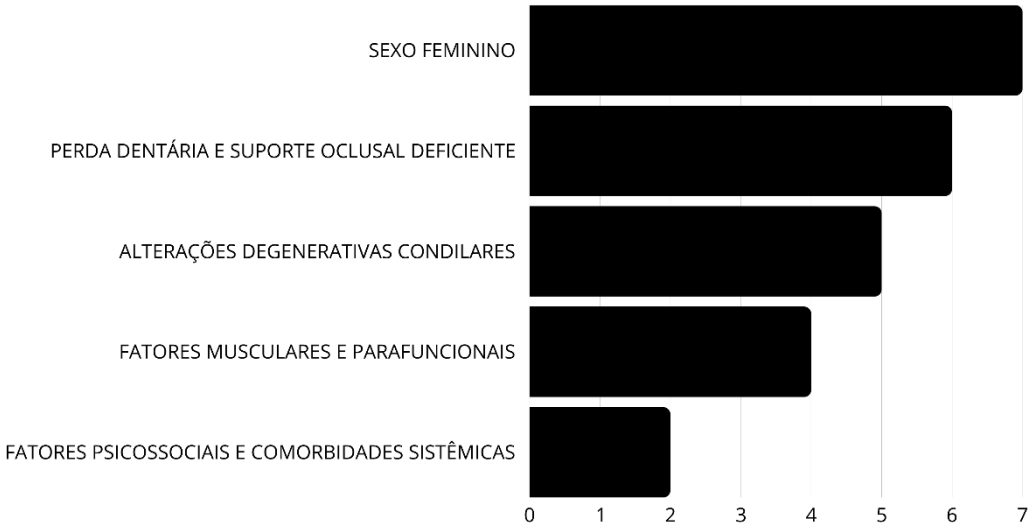
| | | | | | |
|---|---|---|---|---|---|
| Rodríguez-Ramos B, et al. | 2020 | 103 patients diagnosed with TMD, aged ≥60 years. Predominantly ♀ (61.2%), with age group 65–69 years (38.8%). | Helkimo Index. Palpation and functional manipulation of masticatory muscles and TMJs performed. Clinical manifestations such as joint sounds, muscle pain, joint pain, and mandibular movement alterations. | Predominantly unreplaced tooth loss as a risk factor (55.3%). Osteoarthritis was the main TMJ condition (39.8%). Joint sounds were the main clinical manifestation (71.4%). | Anatomical proximity of the TMJ to auricular structures leading to referred pain and inflammation associated with TMD. |

| | | | | | |
|---|---|---|---|---|---|
| Zatt FP, et al. | 2021 | 282 elderly aged ≥60 years (mean 71.42 ± 7.89 years; 81 ♂, 201 ♀). | Fonseca Anamnestic Index (FAI). | Elderly ♀ with TMD (62.8% higher prevalence ratio; p = 0.040) compared to elderly ♂. | Trauma, joint overload, hormonal, psychological (stress), neuromuscular, occlusal alterations, and degenerative processes related to aging. |

The analysis of the articles revealed that, in seven of the studies, the prevalence of TMD was identified in females. Tooth loss and loss of occlusal support were found to be the main origins of TMD in individuals over 60 years old, followed by degenerative changes in the TMJ, parafunctional alterations of the masticatory muscles, and finally, psychosocial factors and systemic comorbidities that may influence the development of TMD.

The most frequently reported symptoms included orofacial pain, joint clicking, and limited mouth opening, often associated with reduced masticatory function and quality of life. The distribution of etiological factors is illustrated in the bar chart (Figure 1).

**Figure 1.** Bar chart showing the distribution of factors associated with temporomandibular disorders.




## Discussion

This systematic review demonstrated that the etiology of temporomandibular disorders (TMD) in elderly individuals is multifactorial, involving primarily degenerative, occlusal, muscular, parafunctional, hormonal, and psychosocial factors. This etiological diversity reflects the anatomical and functional changes resulting from the aging process, which directly impact the temporomandibular joint (TMJ) and the stomatognathic system (16,17).

Joint degeneration associated with senescence was widely highlighted in the included articles, corroborating findings by Wu, Lin, and Lin (2025) and Yadav et al. (2018) (18,19), who link aging to degenerative TMJ processes such as cartilage wear, bone remodeling, and decreased synovial lubrication. These structural changes favor painful conditions and restricted mandibular movement, making diagnosis and clinical management more complex in this age group.

Another important factor identified was tooth loss and reduced occlusal support, which are directly related to joint overload and muscular adaptation of the masticatory system (20). The absence of dental elements can induce compensatory masticatory patterns, contributing to biomechanical imbalance of the TMJ and

greater susceptibility to developing TMD. In line with this, Segù and Manfredini (2019) (21) emphasize that preservation of natural dentition or proper prosthetic rehabilitation is essential to minimize functional impacts in the elderly.

In addition to structural changes, muscular and parafunctional factors were consistently reported. Evidence suggests that habits such as bruxism, combined with decreased muscular adaptive capacity, intensify joint overload (22). This condition may be exacerbated by psychosocial factors, such as stress and anxiety, which have been identified as potential triggers or aggravators of TMD in elderly individuals (23).

Another relevant aspect is the influence of hormonal changes and systemic comorbidities. Endocrine alterations and chronic conditions, such as osteoarthritis and metabolic diseases, have also been associated with joint dysfunction (23). These findings reinforce the need for a multidisciplinary approach in the diagnosis and treatment of TMD in older adults, integrating dentistry, geriatrics, physiotherapy, and psychology.

Despite its relevance, this review faced methodological limitations inherent to the included studies, such as sample heterogeneity, varying diagnostic criteria, and the absence of randomized clinical trials, which hinder direct comparisons between studies (14). Nevertheless, the gathered data contribute to understanding the etiological profile of TMD in the elderly population, highlighting the importance of early assessment, individualized rehabilitation planning, and preventive strategies to minimize the functional and psychosocial impact of these disorders.

## Conclusion

This review suggests a potential influence of female sex as a predictor of TMD in individuals over 60 years old, and that tooth loss and occlusal support are the main origins of TMD in this population.

It is recommended that further reviews be conducted to identify the profiles of elderly individuals presenting with TMD, as well as tools to assist in diagnosis and treatment.

## Acknowledgment

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