



# Mechanisms of association between Temporomandibular Disorder and Vertigo

## Mecanismos de associação entre Disfunção Temporomandibular e Vertigem

### Los mecanismos de asociación entre el Trastorno Temporomandibular y Vértigo

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#### Abstract

The aim of this paper is to present an overview of studies that associate the temporomandibular disorder and vertigo. The literature review is narrative-descriptive carried out in three databases (LILACS, MEDLINE e SciELO), including publications dating from 1990 to 2012 in English and in Portuguese,

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total of eighteen articles. Results show that distinctive mechanisms may be present in the pathophysiology of otologic symptoms in general and, more specifically, of vertigo associated with TMD.

**Keywords:** Pain, Temporomandibular Joint Disorders, Dizziness.

## Resumo

*O objetivo deste estudo foi identificar a produção do conhecimento sobre os Mecanismos de associação entre Disfunção Temporomandibular e Vertigem. A pesquisa baseia-se em uma revisão narrativo-descritiva de literatura feita em três bases de dados (LILACS, MEDLINE e SciELO), com ano de publicação entre os anos de 1990 e 2012 e nos idiomas inglês e português, sendo incluídos 18 artigos. Verificou-se que inúmeros mecanismos distintos podem estar presentes na fisiopatologia dos sintomas otológicos de modo geral e mais especificamente da vertigem em relação à DTM, ocasionando assim, sua interação.*

**Palavras-chave:** Dor, Transtornos da articulação temporomandibular, Tontura.

## Resumen

*El objetivo de este estudio fue identificar la producción de conocimientos sobre los mecanismos de asociación entre el trastorno temporomandibular y Mareo. La investigación se basa en una revisión narrativo-descritiva de la literatura realizada en tres bases de datos (LILACS, MEDLINE e SciELO) con el año de publicación entre 1990 y 2012 y en Inglés y Portugués, e incluyó 18 artículos. Se encontró que varios mecanismos diferentes pueden estar presentes en la fisiopatología de los síntomas otológicos en general y más específicamente en relación con el DTM, causando así su interacción.*

**Palabras clave:** Dolor, Trastorno de la Articulación Temporomandibular, Mareo.

## Introduction

Temporomandibular joint (TMJ) disorder covers a variety of clinical problems involving the masticatory muscles, the joint itself, and associated structures to the ear region. Temporomandibular disorder (TMD) is a general term for the clinical problems that involve the masticatory muscles, the TMJ, and associated structures<sup>1,2,3</sup>.

The otologic symptoms related to TMD most cited in the literature are tinnitus, otalgia, ear fullness, hearing loss and vertigo<sup>5, 6, 7, 8, 9</sup>. There are some hypotheses regarding the relationship between otologic symptoms and the TMD<sup>3-11, 12, 13</sup>.

Tinnitus is a symptom defined as the perception of noise in the ears or in the head without it being produced by an external source<sup>18</sup>.

Vertigo is a roundabout dizziness, a loss of body balance, observed in many diseases and it may be associated with many comorbidities<sup>4</sup>. This condition mainly affects the elderly, and its etiologic

factors should be investigated to increase the efficiency of treatment<sup>4</sup>. Since both vertigo and TMD are common among the population at large, some epidemiologic studies have tried to indicate the mechanisms and association between vertigo and TMD, but this topic still is controversial<sup>1-5, 6, 7, 8, 9</sup>.

A review of eighteen epidemiologic studies reports that the most common symptoms among patients with TMD are: noises from the TMJ (19%); tiredness and stiffening of the jaw (11%); feeling of pain while moving the jaw (6%); limited jaw movements (8%); stuck or locked jaw (4%) and cephalalgia (17%). The association between otologic symptoms and TMD is not recent. Many authors suggest what the causes may be, as well as consequences and hypothetical treatments<sup>10</sup>. The aim of this paper is to present an overview of studies that associate the temporomandibular disorder and vertigo.



## Description

This paper presents an overview of studies that associate the temporomandibular disorder and vertigo. The literature review is narrative-descriptive, carried out in three databases (LILACS, MEDLINE e SciELO), including publications dating from 1990 to 2012 in English and in Portuguese. The eighteen articles were found through the search for the terms: “pain”, “temporomandibular disorder” and “dizziness”, along with their combinations. The studies were evaluated in a blind and independent manner, rigorously obeying the inclusion criteria: full text, target population (adult and elderly), qualitative approach, interventions, type of study (without delimitations) and language (Portuguese and English). The works that did not obey to the inclusion criteria mentioned above were excluded from this study.

First, twenty three articles were found. However, only eighteen were kept because the association between the terms searched was not present in the others.

The presence of otologic symptoms in patients with TMD has been hypothesized based on the anatomic-functional relationship between the temporomandibular joint (TMJ), the muscles innervated by the trigeminal nerve and the ear structure.

Most of the work by Felício et al. (2004) verified the disharmony of the stomatognathic system which manifests as orofacial pain and difficulties in functional activities, which is significantly associated to the otologic symptoms in TMD cases<sup>8</sup>. Changes in the central inhibitory mechanism may favor difficulties in regulating the pain coming from muscles and other deep structures. This contributes to the development and continuity of myalgia as a result of the lack of inhibition of the ascending reticular system, responsible for limiting responses of the central nervous system to the somatosensory impulses<sup>12</sup> (Maixner et al., 1998).

Another hypothesis shows that, in its turn, the occurrence of hyperactivity in the muscles of mastication will cause a contraction of the tensor tympani and the tympanic membrane or the muscle contraction of the soft palate. This may cause dysfunction of the auditory tube and, subsequently, symptoms of ear fullness, unbalance and hearing loss<sup>3-14</sup>.

A previous study, supposing that there is a functional connection between the masticatory apparatus and the ear, evaluated the vestibular behavior in 27 female patients with TMD, ranging from 30 to 53 years old, through the following procedures: anamnesis, otologic inspection and vestibular evaluation by means of the vectoelectro-otography. The authors verified that the most frequent complaints were: difficulty to move the neck, or pain as doing it, pain extending to shoulders and arms, tinnitus and upper-limb paresthesia (77,7%), dizziness and headache (66,6%), anxiety (55,5%), hollow sensation in the head, unquiet sleep and depression (51,8%)<sup>15</sup>. The vestibular testing presented alterations in 74% of the patients; in the caloric test, there was an alteration frequency in the peripheral vestibular system and in the deficient peripheral vestibular syndrome. A high rate of alteration was noticed in the vestibular system of patients with TMD. The authors stress the importance of applying labyrinthine tests in this type of population, as well as the relevance of researches regarding the effectiveness of labyrinthine rehabilitation in the remission and/or overcoming of the symptomatology in these patients<sup>15</sup>.

Another article observed that the symptoms frequently associated with TMD are cephalalgia, tinnitus, otalgia, perception of noises at the TMJ, changes in balance and painful touch of temporomandibular structures. In some movements, the mandibular condyle ends up exerting pressure in the auriculotemporal nerve, next to the TMJ capsule, triggering the painful process along the temporal area<sup>16</sup>.

A research verified that TMD occurred more frequently during the fourth decade of life and among women. According to the authors, the jaw and the middle ear ossicles have the same embryologic origin, which explains why many malformations of the middle ear are related to jaw alterations. In addition, the anatomy and the biomechanics of the TMJ are interrelated because they are closely associated with aural functions and structures. Finally, the researchers hypothesized that vertigo can be caused by harmless painful stimuli occasioned by TMD in the peridiscal tissues, provoking arterial constriction in the temporal area, thus diminishing the blood supply in the vestibular area of the inner ear<sup>17</sup>.





## Final Considerations

Based on the studies reported in the literature, it is observed that different mechanisms may be present in the physiopathology of the otologic symptoms in general and, more specifically, of vertigo associated with TMD. This narrative-descriptive review points out that populational studies are still necessary in order to better clarify the association between vertigo and TMD's mechanisms.

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