

# Postural and manual therapy in temporomandibular dysfunctions

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• **Conflicts of interest:** none declared.

## ABSTRACT

**Objective:** to show the benefits of manual and postural therapy in temporomandibular joint alterations and to cite the techniques that can be used to treat these dysfunctions. **Material and Methods:** a narrative review of the scientific literature on the subject was carried out in books of the Physiotherapy and Dentistry areas, scientific articles through periodicals and sites, referring to publications of the last eighteen years, using as keywords: manual and postural therapy, temporomandibular joint dysfunctions, and temporomandibular joint. **Results:** 1.930 studies were found, of which 602 were selected for title/abstract reading, being 564 of them excluded due to lack of compliance with the inclusion criteria; thus, a total of 38 references were included. The literature reports several manual and postural techniques as beneficial resources for the treatment of temporomandibular joint alterations since they act from prevention to rehabilitation phases, regrouping the compromised muscles and recovering the functionality of the ear-jaw articulation. **Conclusion:** Physical Therapy, together with manual and postural therapy techniques, is important for the treatment of temporomandibular joint changes since its objectives are to activate blood circulation, relieve pain, promote muscle relaxation, and re-educate posture, aiming to promote patient well-being.

**Keywords:** Musculoskeletal manipulations; Temporomandibular joint dysfunction syndrome; Temporomandibular joint.

## Introduction

The temporomandibular joint (TMJ) is one of the most complex and specialized joints of the body, being one of the structures that make up the masticatory system.<sup>1,2</sup> Such system is a functional unity of the organism, which includes, in addition to the TMJ, the frontal and temporal bone, hyoid bone, cervical vertebrae, maxilla, mandible, sternum, clavicle, teeth, saliva, blood, lymphatic, nervous and muscular systems, all interconnected and interrelated among themselves.<sup>1</sup> That is the reason why mastication, deglutition, phonation, and posture very much depend on the TMJ function, health, and stability.<sup>3,4</sup>

The TMJ is the most often used joint in the body because it performed several movements during speech, chewing, swallowing, yawning, and snoring. In addition, it has two movement phases: a phase of oscillation, when the joint is moving, and a phase of accommodation, which occurs when this joint is not being used.<sup>5</sup> Alterations in this joint comprise what is called TMJ changes.

The main signs and symptoms that can be identified in temporomandibular joint changes are: muscle and joint pain, movement limitations, noises of joint deviations in mandibular movements, and poor cervical posture.<sup>1,6,7</sup> Moreover, it can also cause feelings of fatigue in masticatory muscles, stiffness, joint noises such as tinnitus and vertigo.<sup>8</sup> Symptoms such as deafness, otalgia, trismus, stretching, prolonged muscle contraction, subluxation or luxation, trauma on the muscular fascia, muscle hyperactivity, and soft tissue thickening<sup>4</sup> are frequently identified. This muscle hyperactivity is related to parafunctional activities, oral habits, and increased muscular tonus level.<sup>2</sup>

This research aimed to show the benefits of manual and postural therapy in temporomandibular joint changes and report the techniques of such therapy that can be used in the treatment of TMJ dysfunctions.

## Material and Methods

A narrative review of the scientific literature on the manual and postural therapy in temporomandibular joint changes through classic books in the fields of Physical Therapy and Dentistry and in scientific articles found in journals and electronic databases (*Bireme, Scielo, Lilacs, Google Scholar, Pubmed* and *Biomedcentral*), referring to publications of the last eighteen years using the following keywords: manual and postural therapy, temporomandibular dysfunction, and temporomandibular joint. Consultations to bibliographical material were conducted in libraries of High Education Institutions, where more information was obtained to enrich this research.

Only literature with scientific foundation and subjects related to the objectives proposed above were included. Data were analyzed through the selection, critical reading, and registration (quotation, summary, and review) of the literature, which were reflected, discussed, and confronted, leading to results and discussions on the subject and contributing to the construction of this study.

## Results

Results were based in the integrative review flowchart (Figure 1) and 1.930 studies were found, of which 602 were selected for title/abstract reading and 564 were excluded due to lack of compliance with the inclusion criteria. Therefore,

a total of 38 references were included. These articles were selected through the authors' criteria since there were already many literature reviews and little research relating Physical Therapy and Dentistry in TMJ changes.

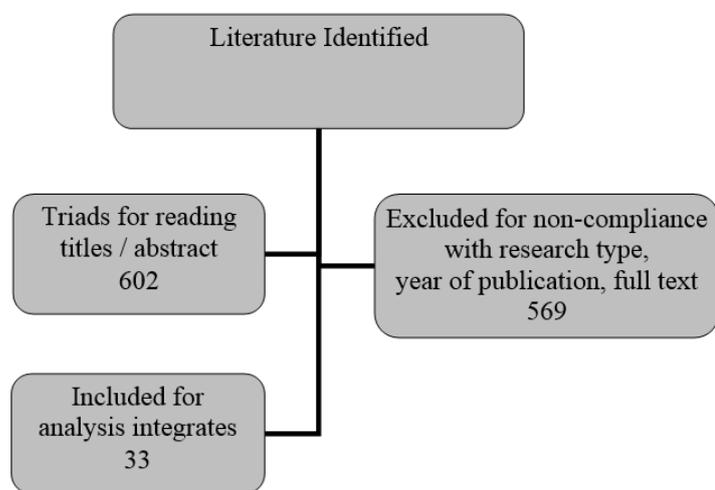


Figure 1. Integrative Review Flowchart

## Discussion

For showing the benefits of manual and postural therapy in temporomandibular joint changes, and anatomical review of the structures was essential. As for skeletal components, the most important ones in the masticatory system are: maxilla and mandible, responsible for supporting the teeth and the temporal bone, which in turn supports the jaw in its conjunction with the skull.<sup>2</sup>

Anatomically, the TMJ is located between the distal region of the mandibular bone and the lower side of the temporal bone. The joint is bounded posteriorly by the post-glenoid spine, the scaly region of the temporal bone, the external auditory conduct and the posterior region of the mandibular fossa. Anteriorly, it is bounded by the joint tubercle; laterally, by the external side wall of the mandibular fossa and the masseter muscle; and superiorly by the temporal bone and the zygomatic arch.<sup>4</sup>

The ligaments that support the TMJ are functional, such as the collateral, capsular, and temporomandibular ligaments, and two accessory ones, the sphenomandibular and the stylomandibular ligaments.<sup>1,2</sup> In addition, the TMJ has two articular surfaces separated by bones, requiring a balanced action in the joint so these areas can work freely. When this does not happen, the result is a temporomandibular dysfunction.<sup>5</sup>

The muscles of the masticatory system can be classified as indirectly related to the function, movement, and mandibular position, which are facial muscles, platysma,

and scapula elevator, and as those directly related to mandibular positions and movements, which are the muscles: masseter, temporal, digastric, lateral and medial pterygoid, sternocleidomastoid, and trapezius.<sup>4</sup>

As for the main function of TMJ, we highlight: allowing the mandibular movements; regulating, synchronizing, and facilitating the bordering mandibular movements (which are the ones that require the maximum limit of the masticatory system structures) or intra-bordering ones (movements that respect the maximum physiological limit); adapting its joint structures to the occlusal and neuromuscular changes to minimize dysfunctions and its effects; and supporting and stabilizing the mandible with the aid of the masticatory system, which includes depression, elevation, protrusion, retrusion, and side-to-side muscles. These movements of mandibular elevation, depression, protrusion, retrusion, and side-to-side deviation are obtained by a combination of intra-articular movements controlled by the muscles.<sup>7</sup>

Each time a muscle shortens, its origin approaches its insertion and the bones on which it is inserted are dislocated; thus, the joints cling to each other and the body finds a way to adapt. When there is a change of the support structures, there can be a postural disharmony generated by a tension of muscle chains, which is responsible for a succession of associated tensions. Therefore, all other muscles that fall on that bone will be changes by the offset, which will propagate to other bones and muscles, and so on.<sup>9</sup>

When there are many clinical problems involving the TMJ, its associated structures, and the masticatory musculature, it can be said that the temporomandibular function changes.<sup>10</sup> This change is highly debilitating and alters the perfect performance of some essential functions, such as chewing food or speaking properly.<sup>8</sup>

Formerly, the temporomandibular joint changes were defined as a set of signs and symptoms manifested because of changes in the masticatory system, whose etiology involved occlusal interferences, loss of teeth or bad dental position, emotional tension, functional changes in the masticatory and adjacent muscles, intrinsic and extrinsic changes of the TMJ structural components, and the combination of such factors. In addition, this dysfunction is currently a much wider concept, in which many denominations for this pathology can be found: temporomandibular dysfunctions and disorders, myofascial pain syndrome, syndrome of painful TMJ dysfunction, and cranio-cervico-mandibular disorder.<sup>1</sup>

The incidence of TMJ changes is highest in women and only 10% of the population affected searches for therapeutic care, in a ratio of five women for each man.<sup>1,11</sup> The age

groups most affected are: 15 years-old, with the cause being frequently of muscular origin, and at 45 years of age, from degenerative joint origin.<sup>12</sup>

TMJ changes are characterized by various types of musculoskeletal, cervical, and masticatory muscle pains, which are the main causes of non-dental pain in the orofacial region. Thus, multiple functional and structural factors are related to the temporomandibular dysfunction origin.<sup>13</sup>

The etiology of temporomandibular changes is multifactorial, as it involves factors of anatomical, occlusal, muscular, and psychological origin. Among the main etiological factors, we emphasize bad dental occlusion, myofunctional changes, harmful habits generating muscle overactivity and consequent joint overload, stress, emotional problems, among others.<sup>14,15</sup>

Several factors classified as primary or secondary determine the development of changes in TMJ dysfunctions. Primary factors are related to pathological changes and tissue injuries in the TMJ, hypertension in the masticatory system and in other muscles. Secondary factors may be psychological, physical, or local. The latter is related to the masticatory system: abnormal occlusion, aberrant mechanical stimulus in the oral cavity, oral habits, poor movements, and excessive external forces on the TMJ and muscles.<sup>15</sup>

Complex etiological factors are classified into three types: anatomical, which are related to occlusion; psychological, related to stress and nervousness; and neuromuscular factors such as the habit of grinding teeth, swallowing erroneously – with tongue interposition and forward displacement of the jaw, generating vices of head, necks, and posture due to labor activities, positioning without mandible support during sleep or with unilateral pressure, and parafunctional habits such as nail-biting.<sup>16</sup>

To confirm the clinical framework of the patient with temporomandibular joint changes, an exam consisting of bilateral TMJ palpation is required, in addition to the use of a caliper to measure the maximum aperture – when in the absence of pain, and the observation of crackles and lateral deviations in the jaw opening.<sup>7</sup>

Patients with chronic TMJ changes must deal with the impact of pain in their lives; they refer to some degree of prejudice at work, school, leisure activities, family relationships, household activities, sleep, appetite/feeding, and personal hygiene.<sup>16</sup>

They may also have other postural changes in which a muscular imbalance and occlusal change can happen, destabilizing the TMJ, such as protraction of head and shoulders, increased dorsal kyphosis, decreased mobility of the cervical spine and trunk with muscle chain shortening, pelvic anteversion, knee hyperextension, and decreased ti-

bio-tarsal angles.<sup>17,18</sup>

It is important to highlight the interrelationship between Physical Therapy - Dentistry, which is necessary to eliminate the causes of TMJ changes, as well as occlusal and joint factors. After and/or at the same time of the dental intervention, Physical Therapy practice is required as an auxiliary and complementary tool to the treatment.

Before starting the Physical Therapy treatment, a thorough and careful evaluation is required to identify the patient's signs and symptoms and ensure an accurate diagnosis, delimiting all changes and postural imbalances and defining the cause of this disturbance so that the patient can be properly treated. Considering that muscle palpation is one of the most important items in the Physical Therapy evaluation, as it identifies asymmetries and muscle tensions and analyzes all muscles in the masticatory system, occipital region, and scapular cinguli, involving the spine,<sup>1</sup> the treatment should be started with this technique.

Physical therapy treatment can also use joint conditioning and postural re-education, through postural therapeutic exercises to diminish pain and reestablish the function of the craniomandibular system and TMJ. Posture correction contributes to the stabilization of the postural tonic system.<sup>19</sup>

Other resources that can be used are heating and cooling thermotherapy, and electrotherapy such as ultrasound, galvanic current, transcutaneous electrical neurostimulation (TENS), and light amplification therapy by stimulated emission of radiation (LASER).

Manual techniques such as kinesiotherapy, proprioception, massage therapy, stretching, manual therapy (manipulation, joint mobilization, joint release techniques), and postural re-education can be used.<sup>1,2</sup> Also, for correcting muscle imbalances and relax and elongate retracted postural muscles, a postural shoulder and cervical stretching is required.<sup>20,21</sup>

Following, the Chart 1 shows studies that report the main techniques of Manual and Postural Therapy that can be used for treating temporomandibular joint changes. Thus, the literature shows several Manual and Postural Therapy techniques that can be used in treating Temporomandibular Dysfunctions. Among them: stretching associated with the relaxation of cervical and masticatory musculature;<sup>1,23,32</sup> manual therapy through myofascial liberation, cervical pompage, manipulation and mobilization of TMJ, spine, and scapular cinguli; and techniques of joint liberation and strengthening of musculature involved in the cervical and TMJ regions are used to rebalance all the alterations caused by temporomandibular joint changes.<sup>1,2,22,33</sup>

**Chart 1.** Description of studies that report the main techniques of Manual and Postural Therapy that can be used for treating temporomandibular joint changes

Author	Clinical/Objective Chart	Manual and postural therapy techniques that can be used in the treatment of temporomandibular joint changes
Paiva, De Sousa <sup>22</sup>	Literature review study, data obtained from the databases: Bireme, Scielo, Medline e Lilacs. Aims to verify the effectiveness of manual therapy techniques in improving craniomandibular disorders, its signs and symptoms.	Observed that physical therapy through manual procedures act on reversible treatment, trying to restore the function of the affect joint and adjacent structures. It benefits, from its resources, patients affected by reducing signs and symptoms and contributing to an improved quality of life.
Di Grazia, Madruga, Peres <sup>23</sup>	29 women aged from 28 to 59 years and with temporomandibular joint disfunction participated in this study. The aim of the study was to analyze and verify the effects of the manual therapy program (Mulligan Method associated with classic massage).	In the analysis of the responses obtained in the visual numeric pain scale, to which the volunteers assigned a value from 0 to 10 – corresponding to their pain at that moment, results showed that before therapy the scores ranged from 7 to 10, and after the manual therapy they decreased to values from 0 to 3. Also, results obtained in the SF-36 questionnaire showed statistically significant differences. The pain improved by the manual therapy.
Santos, Pereira <sup>24</sup>	Search in the electronic databases Lilacs, SciELO, Medline, and Pubmed, gathering clinical trials from 2004 to 2014 that reported manual therapeutic procedures, alone or in association with other therapies, in the treatment of TMD in adults.	Studies showed the effectiveness of manual therapy in relieving painful symptoms, improving the pattern of masticatory muscle contraction, and restoring joint mobility. In addition, they reported that the result significance was due to the association of manual techniques with other therapies such as electrophysical resources and drugs.
De Freitas <i>et al.</i> <sup>25</sup>	Case report of a patient with temporomandibular disorder, performing a 30-minute physical therapy treatment twice a week, for eight weeks.	Trigger-points deactivation techniques were performed, as well as joint mobilization, segmental stabilization, and functional exercises. There was improvement in pain, muscle function, range of motion, and posture.
Assis, Soares, Victor <sup>26</sup>	This research aimed at studying the influence of low-intensity laser therapy (diode) in the treatment of temporomandibular disorders.	Although the laser therapy had satisfactory results in reducing the painful symptoms of TMD, the parameters used are still controversial.
Garcia and Oliveira <sup>27</sup>	The objective of this research was to analyze the effectiveness of physical therapy in treating signs and symptoms of the TMJ dysfunction. This was an experimental case study.	Relaxation techniques on the muscles involved in the dysfunction, kinesitherapy, intraoral manipulation, ultrasound, and laser. After physical therapy reevaluation, reduction of pain, increase of joint mobility, ADM gain, and muscle restoration in the cervical region were observed.
Rodrigues and Cervaens <sup>28</sup>	The aim of the computerized database research was to analyze the influence different protocols of manual therapy on temporomandibular joint dysfunctions.	Results showed that almost all techniques applied were effective, such as accessory mobilization in the mandible, inhibition techniques when associated with exercises, as well as relaxation and stretching exercises, all of them with positive results in the therapeutic intervention, unlike myofascial induction techniques.
Santiago <i>et al.</i> <sup>29</sup>	The objective was analyzing the effectiveness of physical therapy resources in treating temporomandibular dysfunctions through a literature review.	According to the articles analyzed, physical therapy techniques proved to be effective in relieving painful symptoms.
Guimarães <i>et al.</i> <sup>30</sup>	Aimed at comparing muscle activity through Surface Electromyography of orofacial muscles and Maximum Bite Force in patients with TMD symptoms in different decubitus, before and after physical therapy.	Results showed there was difference between the variables condition/position and condition/moment, showing that the treatment was effective when comparing patient condition, with a significant relief of pain.
Tedeschi-Marzola, Pasqual, and Marzola <sup>31</sup>	The aim was to analyze the physical therapy resources in treating TMD.	Physical therapy resources are effective for treating temporomandibular dysfunctions, acting mainly in relieving painful symptoms.

Muscle stretching can be used as a Physical Therapy technique for patients with TMJ changes who present retraction in postural muscles since these stretching exercises have as benefits: to avoid or eliminate musculotendinous shortenings; to diminish the excessive rigidity and the risk for some types of musculotendinous injuries; to increase or maintain flexibility and muscle relaxation; to improve blood circulation; to reduce the antagonist muscle tension; to improve muscle symmetry; and to avoid or eliminate postural problems that change the gravity center, provoking muscle-joint deviation.<sup>32,33</sup>

The benefits of stretching may be: to reduce the excessive rigidity and the risk of some types of injuries; to avoid or to eliminate musculotendinous shortenings and antagonist muscle tension; to increase and/or maintain the flexibility and the muscle relaxation with improved blood circulation; and avoid and/or eliminate the postural problems.<sup>32</sup>

Patients with TMJ changes require relaxation of the masticatory and cervical muscles, the reason why massage therapy should be used. This feature aims to improve blood circulation, control the nervous system, promote tissue relaxation, and improve the restrictions to the muscle tissue functions. Ultimately, it benefits the body condition, stimulating it through phases involved in restoration, rehabilitation, normalization of anatomic and physiological capacity and function.<sup>34</sup> Also, the relaxation of the trapezius muscle fascia and occipital base, which is performed through cervical pompage, is used in association with respiration and, especially, expiration, being this method quite effective because it promotes the elongation of posterior-superior chain.<sup>1</sup>

Another technique is the Global Postural Re-education which deals with overall muscle-joint problems by using muscle-stretching postures based on morphology normalization, i.e., on the structure of the striated muscle. It also acts on neuromuscular tensions, introducing a more active, global, and qualitative work, and acting similarly on the psychosomatic transmitter.<sup>34,35</sup>

In almost all cases of temporomandibular joint changes that require a Physical Therapy intervention, the main considerations should regard the soft tissue of masseter, pterygoid, and temporal muscles, which should receive adequate attention before TMJ corrections.<sup>35</sup>

To treat TMJ problems, methods with compression and decompression are used. If the jaw cannot totally or properly open, there is a technique of muscle energy that can be used since it promotes the relaxing effect on the muscles that are tense or shortened, acting on the restriction of jaw opening.<sup>35</sup>

*Isostretching* is a global postural gymnastic which is held in a correct spine position during the maximum and prolonged expiratory phase. Patients are instructed to execute

the predetermined correction postures, and, at the end of treatment, the muscle tensions are balanced due to the spine realignment. The postural kinesiotherapy, in turn, applied through *isostretching*, proved to be effective as to the better functioning of TMJ. This suggests that this technique is a resource for treating temporomandibular joint changes.<sup>36</sup>

Considering the large number of professionals untrained to perform TMJ treatment and the many people suffering from temporomandibular joint changes, we were interested in searching the literature for knowledge regarding the use of manual and postural therapy in the treatment of pain, functional rehabilitation, re-education and restructuring of postural changes from temporomandibular disorders.<sup>1,19,33</sup> Thus, this study can be a research base for academics and health professionals, so they can provide benefits to patients with this disorder, making it relevant to scientific research.

Physical Therapy acts to relieve, among others, the cervical and masticatory muscle symptoms, in addition to working a global postural alignment.<sup>1,33</sup> Posture depends on the TMJ function, health, and stability. Therefore, if there is a TMJ disorder, the masticatory complex will be destabilized, thus interfering with proper posture.

TMJ compression/decompression techniques can be also used,<sup>23,37</sup> such as the muscle energy technique, already cited above, which can be widely used for tense or shortened muscles,<sup>24,37</sup> nasolabial fold release, opening the palate,<sup>23</sup> crossed pisiform bone, twisted mobilization of spine and cervical joint, global facial mobilizations and inhibition techniques of trigger points, overall elongation technique, vomer and masseter liberation techniques, joint techniques for TMJ and TMJ de-coaptation, and overall and specific *isostretching* for masseter muscle.<sup>5</sup>

Postural awareness and re-education training through therapeutic exercises for establishing the tonic system and the balance of the masticatory complex<sup>1,19,20,33,35</sup> and through *isostretching* were effective methods for a better functioning of the TMJ.<sup>25</sup>

In a case study of a patient with temporomandibular joint changes, a four-session treatment with manual therapy was performed, with satisfactory results represented by a significant gain of painless movement amplitude and recovery of mandibular function in a short time, being the intervention in the cervical spine very important for this outcome.<sup>22,36</sup> In another study on TMJ changes, the patients were treated with global and specific techniques to medicate their symptoms and had a significant correlation between improvement of pain and of weakness in the masseter muscle.<sup>24,37</sup>

Thus, Physical Therapy is effective in treating temporomandibular joint changes since it activates the blood circulation, relieves pain, promotes muscle relaxation, and re-educates the patient's posture.<sup>33,37</sup> The Physical Therapy treatment aims to promote musculoskeletal balance, seek-

ing to raise postural awareness to later treat the temporomandibular joint changes.

Associating manual and postural therapies with cervical pompage, massage with respiration, leads to very effective results since they favor the elongation of the posterior-superior chain, bringing benefits such as pain reduction and reestablishment of the TMJ and craniomandibular system functions. Therefore, postural exercises and training have a positive impact on the dysfunction and symptoms of temporomandibular joint changes.

## Conclusion

We concluded the practice of Physical Therapy is of paramount importance for treating temporomandibular joint changes, emphasizing the manual and postural therapy as an effective resource to treat this dysfunction.

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### Mini Curriculum and Author's Contribution

1. Joicinara Luz Sousa Pachêco Bezerra – DDS. Contribution: data interpretation and final review.
  2. Esmhirna Liberalino Vilar – DDS. Contribution: participated in the data collection.
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