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Health problems caused by Temporomandibular Dysfunction (TMD) and their possible forms of treatment

Problemas de saúde causados pela Disfunção Temporomandibular (DTM) e suas possíveis formas de tratamento

Problemas de salud causados por la Disfunción Temporomandibular (DTM) y sus posibles formas de tratamiento

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Abstract
Objective: To discuss TMD, addressing what this dysfunction can cause, how it occurs, and what problems and solutions are applied to this condition. Methodology: Searches using the website databases: The Cochrane Library, Web of Science, PROSPERO, Science Direct, CAPES Journal Portal, Scielo, Research, Society and Development and Google Academy. As this article is a narrative literature review, the study of Rother was used to serve as a basis for structuring the article. Results: Our search resulted in 40 articles. Conclusion: TMD is a dysfunction of the temporomandibular joint that can be caused by emotional problems such as anxiety, due to changes in the oral structure, with the occlusal splint as a possible treatment. Problems such as changes in the posture of the cervical spine can cause TMD, and butolinic toxin is a possible treatment for this dysfunction, which can also cause hearing problems if there is no improvement.
Keywords: Temporomandibular joint dysfunction syndrome; Ear-jaw articulation; Temporomandibular joint disorders; Temporomandibular joint disc; Orofacial pain.

Resumo
Objetivo: Abordar sobre a DTM abordando o que essa disfunção pode causar, como ocorre, e quais problemas e soluções aplicadas a esse acometimento. Metodologia: Buscas utilizando das bases de dados dos sites: The Cochrane Library, Web of Science, PROSPERO, Science Direct, CAPES Journal Portal, Scielo, Research, Society and Development and Google Academy. Sendo esse artigo uma revisão de literatura narrativa, o estudo de Rother foi usado para servir como

base na estruturação do artigo. Resultados: Nossa pesquisa resultou em 40 artigos. Conclusão: A DTM é uma disfunção da articulação temporo mandibular que pode ser causada por problemas emocionais como a ansiedade, por motivos da estrutura bucal provocada por uma alteração, tendo a placa oclusal como um possível tratamento. Problemas como alterações da postura da coluna cervical podem ocasionar a DTM, e a toxina botulínica entra como um possível tratamento dessa disfunção, que pode também pode trazer problemas auditivos se não houver melhora.
Palavras-chave: Síndrome da disfunção da articulação temporomandibular; Articulação temporomandibular; Transtornos da articulação temporomandibular; Disco da articulação temporomandibular; Dor orofacial.

Resumen
Objetivo: Discutir los TTM, abordando qué puede causar esta disfunción, cómo ocurre y qué problemas y soluciones se aplican a esta condición. Metodología: Búsquedas utilizando las bases de datos de sitios web: The Cochrane Library, Web of Science, PROSPERO, Science Direct, CAPES Journal Portal, Scielo, Research, Society and Development y Google Academy. Como este artículo es una revisión narrativa de la literatura, se utilizó el estudio de Rother como base para estructurar el artículo. Resultados: Nuestra búsqueda resultó en 40 artículos. Conclusión: El DTM es una disfunción de la articulación temporomandibular que puede ser causada por problemas emocionales como la ansiedad, por cambios en la estructura bucal, siendo la férula oclusal como posible tratamiento. Problemas como cambios en la postura de la columna cervical pueden provocar TTM, y la toxina butolínica es un posible tratamiento para esta disfunción, que también puede provocar problemas de audición si no hay mejoría.
Palabras clave: Síndrome de disfunción de la articulación temporomandibular; Articulación oreja-mandíbula; Trastornos de la articulación temporomandibular; Disco de la articulación temporomandibular; Dolor orofacial.

1. Introduction

Temporomandibular dysfunction (TMD) is a complex condition that affects the temporomandibular joint, potentially resulting in a variety of debilitating symptoms that are often unknown to clinicians. This dysfunction can be triggered by emotional factors, such as anxiety, as well as changes in oral structure, particularly tooth loss. TMD is now known to cause orofacial pain and can negatively affect cervical spine posture, as well as being associated with hearing problems. The inability to open the mouth is one of the characteristics (Al- Ani & Gray, 2007).

TMD is a dysfunction that is not caused by a single or specific cause, which prevents the establishment of a ‘’universal cause’’ that identifies the onset of this problem, as it is something that has a range of factors that cause this condition. The etiology of this dysfunction is undefined and self-limiting, so it is recommended that non-invasive and reversible therapies be used at the beginning of treatment to avoid major problems and adverse effects that could further harm the problem. Treatments aim to reduce and control pain, stimulating the recovery of the masticatory system of the person with TMD, gradually and gently reeducating the patient (Barbería et al., 2004).

Temporomandibular dysfunction (TMD) is seen as a subclassification of musculoskeletal dysfunctions that are chronic or recurrent, and show a range of symptoms and signs that appear over time (Barbosa et al., 2008). To discuss TMD, addressing what this dysfunction can cause, how it occurs, and what problems and solutions are applied to this condition.

2. Methodology

Research was carried out using data available in PUBMED Central and VHL/BIREME. Information available in databases and websites such as The Cochrane Library, Web of Science, PROSPERO, Science Direct, CAPES Journal Portal, Scielo, Research, Society and Development and Google Academy was also used. This article was produced based on the influence of the work done by Rother (2007), research that points out how a narrative literature review article should be structured, how the topic should be approached and the steps to be followed in its implementation methodology. The following descriptors were used to obtain more information on the topic: Temporomandibular Joint Dysfunction Syndrome; Ear-jaw articulation; Temporomandibular Joint Disorders; Temporomandibular Joint Disc; Orofacial Pain.

3. Results

3.1 Temporomandibular Dysfunction: symptoms and signs

The American Association of Orofacial Pain states that temporomandibular disorder, popularly known as TMD, is a term that is used to represent a certain group composed of orofacial pain, which manifests itself through symptoms and signs such as: pain in the muscles those who chew and those located in the neck, pain in the ear on one of the two sides, crepitus, difficulty in expanding the jaw, deviations, clicking sounds, difficulty in chewing and discomfort combined with pain in the temporomandibular joint known as TMJ (Al-Ani & Gray, 2007).

Through studies carried out by different researchers, it was seen in the literature that there are specific symptoms and signs that are classic when it comes to a person with TMD, namely: pain in the face and ear region, neuralgia, headaches and in the region of the neck, daily tinnitus, jaw locking, pain in the joints and muscles, noises produced by the joint when the mouth opens and closes (Barbería et al., 2004; Barbosa et al., 2008).

Based on the signs and problems caused by TMD, it is seen that to treat this condition, it is necessary, in most cases, a group of health professionals carrying out a multidisciplinary action, which will align the treatments that each one can provide, being these professionals: oral and maxillofacial surgeon, dental surgeon, rheumatologist, speech therapist, physiotherapist, neurologist and a psychologist (Ferreira et al., 2009).

3.2 Possible treatments

3.2.1 Occlusion Plate

Pain can be measured through the use of several different scales, which is very essential during the clinical practice of the dental surgeon, which is used by the dentist to acquire a total view of the condition of any patient and their needs (Huber et al., 2007).

The occlusion plate has many functions, one of which is to temporarily promote the joint position, which provides greater orthopedic stability. It also serves as a form of protection for the teeth and support structures from abnormal forces that can destroy or end up causing damage. dental destruction, having the function of promoting a good functional occlusion that organizes the neuromuscular activity that is abnormal, bringing a more ideal and beneficial muscular function.

The resilient plate should be used as an emergency treatment even if it is manufactured easily and is best tolerated in the lower arch. To make this plate, only a single mold is needed, making it easy and cheap to manufacture, however, its adjustment is sometimes difficult to carry out. Approximately 10% of the cases in which this device is used, the patient may develop worse symptoms and intensify those that are already manifesting.

Patients who have bruxism, due to the fact that they know that a compressible material is located in their mouth, end up increasing the activity carried out by the muscles, and it is extremely important to use the device only at night and if it is successful, evidence will appear around 6 weeks, however, over 4 to 6 months its resilience may be lost. The Michigan plate, or also known as the Fox plate, stabilization plate, centric relation plate and rigid conventional plate as it is better known, has the function of being applied when there is a discrepancy between the centric relation or stabilization plate, centric occlusion and occlusal inferences. become etiological factors.

Studies state that the purpose of the stabilization plate is for the patient in static occlusion to have maximum equal force combined with maximum contact between opposing teeth and the plate (Gray & Davies, 2001; Zhang et al., 2023; Zhao et al., 2022).

3.2.2 Botulinum Toxin in the treatment of TMD

One of the most used, well-known and important substances in the area of rejuvenation is the substance called botulinum toxin or TB, which is a technique that does not cause harm to the human body, which is extremely relevant nowadays, including in the prevention of future surgical procedures. Botulinum toxin is produced by a gram-positive anaerobic bacterium called Clostridium botulinum, which is found in 7 different types of serum: type A, B, C, D, E, F, and G and which are produced from breakdown (lysis) carried out by the bacteria (Benecke, 2012).

Type A toxin, when injected intramuscularly, binds to terminal receptors located in motor nerves, blocking the release of acetylcholine in the pre-synaptic terminal through the shutdown of fusion proteins, causing acetylcholine to be prevented from be released into the synaptic cleft, in this way, the depolarization of the post-synaptic terminal is prevented from occurring, blocking muscle contraction by temporary chemical denervation and competitive inhibition in a dose-dependent manner (Ribeiro et al., 2014).

The so-called "temporomandibular joint pain syndrome" may be a consequence of spasms of the masticatory muscles, which cause pain due to muscle fatigue or continuous contraction (Travell et al., 1942). Taking this theory into consideration, studies have shown that botulinum toxin type A is a substance that promotes pain improvement, through its extremely effective myorelaxant function, which produces relaxation in the muscles, relieving, improving pain and balancing mandibular function. (Freund & Schwartz, 1998; Freund et al., 1999; Lindern, 2001; Amantéa, 2003).

3.2.3 Orthognathic surgery

Nowadays, orthognathic surgeries are normally used to treat serious skeletal discrepancies in patients, discrepancies that can negatively influence the person's quality of life, as they are something that affects the patient's appearance, along with their oral function. or not. Orthognathic surgery must be planned in conjunction with a psychologist, due to the fact that this surgery changes the aesthetic appearance, so that the patient begins to accept their new appearance in a healthy way, which will add to a functional and aesthetic improvement (Silvícola, 2014; Baherimoghaddam et al., 2014).

Studies indicate that temporomandibular dysfunction improves after orthognathic surgery in some cases, while others claim that there are no significant improvements or even that symptoms worsen after surgery. Some studies show that patients with TMD experience an improvement in their symptoms after a certain time, however, this raises the question of whether this is due to the clinical nature of TMD or because of surgery. It is also seen that a small portion of patients who have TMD but are asymptomatic, after orthognathic surgery, start to develop symptoms of the dysfunction. Thus, orthognathic surgery is relative when taken into consideration as a form of treatment for temporomandibular joint disorders.

However, the dental surgeon must take into account the shape and type of fixation that will be used to reposition the condyles, due to the fact that if the fixation generates torque on the condyles, the temporomandibular joint may end up undergoing some change that causes condylar resorption. , which has the potential to cause malocclusion, pain and temporomandibular disorders (Ueki et al., 2006).

3.2.4 Low intensity laser therapy

LBP or low-power laser therapy works through biostimulation, modifying the functions of tissues and cells, interacting with mitochondria, so that greater production of adenosine and triphosphate occurs and inhibiting cyclooxygenase. Thus, there is a decrease in the levels of prostaglandin and beta interleukin and an increase in the level of endorphin and serotonin, causing pain to be reduced. LBP is a non-invasive therapy, which has very few side effects, therefore, the laser is used to treat different types of TMD (Costa, 2015; Nadershah, et al., 2019).

Studies have had results that point to the conclusion that LBI promotes immediate pain remission after its use, showing it to be effective for the immediate relief of pain symptoms from the first to the second moment. However, the LBI does not prove to be effective in the long term, meaning that when measuring the third moment after 30 days of its end, pain was present. A myofunctional assessment carried out in a study states that muscles may present disorders before or after treatment (Melchior et al., 2013).

Thus, scientific evidence shows that LBI can bring a great improvement in the range of left and right movements of the jaw, showing that laser therapy is effective in promoting an increase in movements performed by the jaw in patients who receive active doses of the laser, caused by analgesic effect linked to low-intensity lasers (Mazzeto et al., 2010).

3.3 Problems related to TMD

3.3.1 Anxiety and TMD

Anxiety disorder is an example of representation that has great importance and challenge within today's society, especially when it comes to something linked to the areas of attention to the human being itself, caused by the fact of the existence of a growing search for obtain knowledge regarding the factors responsible for provoking anger and its results combined with the implications (Cestari & Camparis, 2002).

In various situations triggered by emotional stress, anger and anxiety, the human body ends up producing physical reactions, which aim to prepare and enable the person to have a fight or flight response depending on the situation in which they find themselves. Among the types of reactions carried out by the body, an example of them is the discharge of nervous tension released in the masticatory muscles, aiming to carry out their contraction. However, when the stressful situation of fear or anxiety passes, the organism returns to its normal balance of functioning before this emotional stimulant.

Studies state that anxiety can present itself in a momentary, passing way that is generated in moments when justified apprehension occurs, which was caused by some stimulating factor or it can be a pathological anxiety, when the reason that causes this problem is not concrete, which is presents routinely having continuation, not having a stimulus or having. When a routine occurs between contact between these psychic factors, in the case of a stimulus generated and maintained in the long term or generated by a pathological origin that has an extremely exaggerated and erroneous evaluation, the physical and psychological symptoms and signs, together with the reactions triggered by these problems, develop and remain, creating incorrect and dysfunctional habits, such as bruxism for example, which will lead to the appearance of muscular hypertrophy, causing the TMJ to be overloaded and orofacial pain to begin, giving rise to to a TMD (World Health Organization, 1992).

3.3.2 TMD and hearing changes

The disorder in a masticatory muscle caused by the development of a TMD, which can have effects that cause dysfunction in the Eustachian tube, hearing loss, tinnitus, headache, otalgia and pressure in the ears (Felício et al., 1996). This is explained because of the anatomical proximity and the function performed between the TMJ and the ear, including the relationship between the vascularization and innervation between both (Meira, 2001).

Balance and hearing are the functions performed by the ear and which are extremely important to the body. The auditory pathways and the external (OE), middle (OM) and inner (OI) ears are part of AS (Munhoz et al., 2000). The embryological origin of the TMJ and the ear comes from the same fissure known as Meckel's cartilage (Morgan, 1992). The temporomandibular joint is anatomically located close to the external auditory canal (EAC), with a correlation between its arterial and vascular portions and its innervation. Therefore, if there is a change in occlusion or physiology, a harmful displacement of neighboring

components and their anatomy may occur, causing several consequences (Meira, 2001). However, there is not much scientific evidence to explain why a pathological change in the TMJ influences the OM and OI (Morgan, 1992).

TMD is a dysfunction in which there are musculoskeletal conditions, whether of the chewing muscles or the cervical region, being responsible for most of the non-dental pain located in the pre-ear region, radiating to the occipital, frontal or temporal portion Pereira et al., 2005; Conti et al., 2003). Patients with pain in the TMJ joint usually complain of ear pain, due to the fact that the ear is located in the temporal bone in relation to the mandibular condyle, being separated only by the eardrum wall. The ear and its proximity to the chewing muscles and the TMJ, together with the trigeminal nerves, provide reflex pain in several patients (Pereira et al., 2005; Hilgenberg et al., 2012).

The symptoms caused by TMD are linked to those of otological origin, the likely answers that explain this relationship are: the absence or loss of posterior dental support, which would generate compression of the articular structures of the TMJ generated by the change in the positioning of the condyle , which is normally confused with a symptom of otological origin, due to the functional relationship played by the temporomandibular joint and its anatomical position (Maria et al., 2015).

Patients who develop temporomandibular disorders may present one auditory symptom or even more than one, without having developed otological pathology, which will be confirmed after a series of exams carried out in the throat, nose and ears. However, a set of muscle groups present constant spasms, or on an individual basis, with only a certain muscle producing this involuntary contraction (Lam et al., 2001).

3.3.3 Cervical spine posture and its relationship with TMD

The correct and beneficial posture for humans is one that brings balance between the support structures, which involves a minimum amount of overload and effort combined with bodily efficiency. The alteration of a segment of the body causes the formation of a new organization, causing the body to originate a compensatory posture (Souchard, 1986).

Research has failed to obtain facts that prove a possible correlation between the cervical angle and the presence of TMD symptoms, however the negative correlation between cervical lordosis and the difficulty attributed to compromised mouth opening indicates that the greater the patient's lordosis, the greater it will be. the difficulty attributed to opening the individual's mouth. There is a difficulty in establishing a causality between the posture of the jaw and the head, due to the fact that if there is a negative jaw posture, the position of the head may change, however, the opposite can also happen. When the body has mandibular retrusion and seeks to compensate for it, the head positions itself anteriorly, as a way of compensating for the compromised mandibular posture (Biasotto-Gonzalez, 2005; Ferraz et al., 2004; Grade et al., 2008 ; Santos et al., 2008).

It is clear that people who have TMD have problems and changes in the posture of their neck and head. Researchers, through many proven studies, state that the influence played by the neuro muscles of the chewing regions combined with the cervical region, actively participate in the positioning of the cervical and mandibular movement (Biasotto-Gonzalez, 2005; Goldstein et al., 1984). Thus, studies show that the posture of the head directly interferes with the posture of the jaw and vice versa, which constitutes a decent change, in addition to the fact that postural changes are linked to stomatognathic structures (Ferraz et al., 2004).

Many studies state that TMD and head posture are correlated, being factors that influence each other (Ferraz et al., 2004; Biasotto-Gonzalez, 2005), however, there is little research and studies that address this relationship and the effect of posture as a factor that worsens TMD symptoms, making it extremely important that new studies be carried out on this topic.

4. Discussion

Temporomandibular dysfunction is a very common condition among men and women, which can appear at different ages at different times in life, where factors encourage the emergence of this dysfunction.

However, one of the problems is the fact that many people have TMD but do not know it, due to lack of knowledge about the problem, thinking that it is something caused by age, some effort made at some point or even think that it is a type of of spasm or response of the body. The other very common type of patient is the one who does not identify the dysfunction because it is at the beginning of its appearance, presenting symptoms that are small or so mild that they end up going unnoticed and will only be noticed by third parties or if the problem evolves.

The search for TMD treatment is extremely important, as it is a problem that can have a major impact on the oral, muscular, joint structure and other parts of the body. The treatment involved teamwork between Physiotherapist, Dentist, Psychologist, Oral and Maxillofacial Surgeon and Orthopedist, being a problem that brings about a multi-professional relationship, which is not limited to just the dental surgeon but rather a group of professionals who will combine their knowledge and skills, to recover the patient diagnosed with TMD, caused mainly by neuromuscular, anatomo-occlusal and psychic factors.

The temporomandibular joint is one of the most complex, unique and important joints in the body that is responsible for daily activities such as chewing, speaking, swallowing and among other actions performed by this small joint. For reasons like this, the TMJ is widely used on a daily basis day being remodeled and shaped by daily impacts and forces that are imposed on it. In this way, the great importance of maintaining periodic visits to the dental surgeon is seen, so that x-rays and physical examinations are carried out, monitoring everything from the aging of the oral structure to how it is after any treatment carried out, and it is extremely important that each person carries out visits to the dentist regardless of whether they have TMD or not, so that this monitoring also serves as a way of preventing possible appearances of this dysfunction, through procedures that promote the patient's health.

One factor that promotes the appearance of temporomandibular disorder is the person's purchasing power, at a time when many people are unable to pay for consultations or treatments that are normally quite expensive, meaning they prefer to deal with pain through analgesics or by holding on to the pain. until it eases somehow.

5. Conclusion

From this, it is seen that TMD is a serious dysfunction and that, in addition to being common in society, it presents a range of impacts not only on oral health, but also as a condition that can harm several areas of the human body, from the cervical , ear canal and even cause negative effects on the emotional health of the patient who has this problem.

Therefore, because it is something that affects many people in society, it is a topic that has increasingly been addressed by more dentists and other health professionals, as it is a dysfunction that can affect health in general, and through this concern, new treatments are increasingly developed, such as the occlusal splint which is highly effective in daily use, orthognathic surgery which has positive evidence, botulinum toxin relieving muscle pain as well as the low-voltage laser.

Thus, it is seen that TMD is a problem that must be studied more and more, from researchers, dentists and scientists who must come together to develop new forms of treatments or improve current ones, so that TMD becomes more common. disappear and people can have a better quality of life, without feeling the severe pain caused by the presence of the dysfunction. It is extremely important that each dental surgeon carries out case reports, showing cases of patients with TMD and the treatment that will be carried out, enriching the dental environment with information that can help other dentists, thus creating a scientific help network that will increase the patient's life.

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