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RELATIONSHIP BETWEEN TOOTHCLENCHING AND TEMPOROMANDIBULAR DISORDERS

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ABSTRACT

Toothclenching is multifactorial condition and it is responsible for generating an overload on the teeth, periodontium, muscles and temporomandibular joints (TMJ). Overload or hyperactivity in the joint can promote joint dysfunction that causes painful symptoms. A parafunctional habit such as the toothclenching involves a big context in the organism and may represent a predisposing factor as well as an exacerbation of temporomandibular dysfunction and chronic pain development. Furthermore, it has consequences on the survival of restorative and rehabilitation treatments. The aim of the present study was to discuss what has already been described in the literature on the relationship between toothclenching and temporomandibular joint dysfunction, through a review of the literature. Conclusion: The diagnosis should be made early, mainly because some damages may be irreversible. Treatment requires the removal of the cause, usually associated with the use of protective measures that minimize hyperactivity, aiming to maintain the integrity of the joint and adjacent structures and well-being of patients with TMJ dysfunction.

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INTRODUCTION

Considered as the most complex articulation of the human body, because its anatomical structures present the capacity of movement, as well as the fact that they are two joints in a single bone structure, the temporomandibular joint (TMJ), is an anatomical and functional structure (Medeiros *et al.*, 2011). It is responsible for performing the functions of the stomatognathic system (SS), such as swallowing, chewing and phonation, which in turn depend directly on the physical integrity and preservation of the joint (Gonçalves *et al.*, 2010; Yobany, 2011). The temporomandibular dysfunctions (TMD) from occlusal, neuromuscular and psychological alterations are common and of great relevance in dental offices (Rahal and Goffi-Gomez, 2009). The signs and symptoms commonly reported by patients presenting with such dysfunction that most stand out are pain in the masticatory muscles and / or joint, noises in the preauricular regions, limitations in mandibular movements, as well as tinnitus and pain in ear (Donnarumma *et al.*, 2011). Although it is considered of multifactorial origin, interruption of harmful

habits is part of the treatment since it assists in relieving tension, directly reducing the spasm-pain cycle and thus facilitating the evolution of the therapeutic process, and reducing signs and symptoms (Torres *et al.*, 2012). One of the most harmful habits for the development of temporomandibular dysfunction is when there is association of teeth grinding with the habit of toothclenching (Santos *et al.*, 2009). The habit of teeth grinding is also from multifactorial origin, and may be influenced by psychogenic factors as well as by the use of certain psychotropic drugs (Ré *et al.*, 2009). This dysfunction induces overload in dental structures, periodontium, masticatory muscles and temporomandibular joints (Portero *et al.*, 2009). The search for treatment, in most cases, only occurs when the damages caused by the toothclenching directly affect the patients' quality of life (Hamata *et al.*, 2009). In this context, the objective of the present study was to address what has already been described in the literature on the relationship between tooth clenching and temporomandibular joint dysfunction, through a review of the literature.

MATERIALS AND METHODS

The bibliographic research was performed online, using the Pubmed search tool (www.pubmed.org), Web of Science

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(www.isiknowledge.com) and Lilacs (www.bireme.br). The search strategy included the following keywords: Bruxism; Temporomandibular Joint; Temporomandibular Dysfunction and Dental Occlusion. We included articles that evaluated the association between teethclenchingand temporomandibular disorders written in Portuguese and English, published in the last 10 years. The exclusion criteria were letters to the editor, editorials and experimental articles which results were not clear. A descriptive analysis of the articles was performed and data were organized to provide objective evidence of the association between tooth clenching and temporomandibular disorders.

LITERATURE REVIEW

Temporomandibular Joint (TMJ): The temporomandibular joint (TMJ) is classified as a complex biaxial synovial joint and is formed by the condyle of the mandibular bone, the mandibular fossa of the temporal bone and a joint disc interposed between these two bone structures (Gonçalves *et al.*, 2010). Synovial due to the fact that inside it has a synovial membrane responsible for producing synovial fluid. Biaxial for performing movements in two planes, and complex by presenting an intracapsular disc (Rahal and Goffi-Gomez, 2009). The articular disc, responsible for dividing the joint into two parts, is composed of a dense fibrous connective tissue, preserving its morphology, unless there are destructive forces or structural changes in the joint. In addition, the disc is inserted in a posterior region that is highly vascularized and innervated with loose connective tissue, the retrodiscal tissue (Alves-Resende *et al.*, 2009). The upper retrodiscal lamina, rich in elastic fibers, is responsible for attaching the articular disc posteriorly to the tympanic plaques, while the inferior retrodiscal lamina, rich in collagen fibers, attaches the lower back border of the disc to the posterior margin of the articular surface of the condyle. In its anterior region, the disc also attaches to the Upper Lateral Pterygoid muscle through tendinous fibers (Portero *et al.*, 2009). Thus, this muscle, which despite its predominant insertion in the pterygoid fovea and, to a lesser extent, the anteromedial portion of the disc and the TMJ joint capsule, is directly involved in the physiological movements of the TMJ and the articular disc, in a manner to stabilize it (Hamata *et al.*, 2009). Biomechanical analyzes of the structures that make up the TMJ revealed that they have the capacity to resist and adapt to functional loads. On the other hand, such structures are not able to tolerate compressive loads for a prolonged time; similar to what occurs in chronic toothclenching (Gama *et al.*, 2013). Grinding and / or clenching is defined as a movement disorder of teeth produced by rhythmic or tonic contractions of the masseter muscles and other muscles of the mandible, which may occur during the waking state or during sleep (Maydana *et al.*, 2010).

Bruxism: Gama *et al.* (2013) reported that sleep-related bruxism, that occurs during sleep is an orofacial motor activity characterized by successive and exacerbated contractions of the jaw lift muscles capable of developing muscular strength around 150 to 340 kg of punctate load in the active periods, and may present as consequences: fractures, periodontal problems, pain, muscle fatigue and headache. It is estimated that daytime bruxism affects about 25% of the adult population, presenting episodes of clenching during the day, with compromise of the total mouth opening of these patients. The presence of constant headache, when aggravating, may present noises or cracks during the execution of mandibular

movements, accompanied by pain in the preauricular region, with formation of trigger points in the chewing muscles (Santos-Darozet *et al.*, 2009). Bruxism is classified as centric or eccentric, where the centric refers to the clenching of the teeth when the teeth are positioned centrally or in the position of maximum habitual intercuspation, thus not occurring laterality movements in the execution of the habit, besides presenting a contraction in a harmonic way between the agonist and antagonist muscles. Unlike central bruxism, eccentric bruxism involves the clenching and sliding of the teeth in the laterality and protrusion movements, thus generating an inharmonic contraction of the muscles (Cardoso *et al.*, 2011). The habit of grinding the teeth, from a general point of view, promotes extensive wear out the dental structures, and damage to the supporting bone, however, there is no complaint of pain (Nishio *et al.*, 2009). Patients who have a habit of clenching their teeth complain of muscle fatigue, pains in the articular regions as well as headache and tension in the cervical region. Usually these painful episodes are chronic (Lida *et al.*, 2010).

Tooth clenching and facial muscle overload: There is an isometric balance between the facial muscles, aiming to promote stability during the movements, or even when static, thus evidencing the harmonic interaction between the neuromuscular systems in the cranium and face region (Lida *et al.*, 2010). An overload in a particular muscle or group of muscles can generate situations such as increased muscle tone and pain in the facial muscles, both directly related to the predisposing factors of each patient, as well as the amount of force exerted during the parafunctional habits, in addition to of the individual physiological response (Michelotti *et al.*, 2010). Painful episodes in the facial musculature are characterized as a regional muscular disorder, in which it has trigger points and sore rigid bands when palpated (Nishio *et al.*, 2009). This condition may be associated with movement limitations and due to sensory effects such as referred pain, secondary and allodynia hyperalgesia (Blini *et al.*, 2010). Myofascial pain associated with parafunctional habits is characterized as muscular pain originating from exercise or exacerbated load, promoting injuries to muscle fibers, reducing the regional blood supply, usually associated with inflammation (Urban *et al.*, 2009).

Temporomandibular dysfunction (TMD) and Tooth clenching: Temporomandibular disorders are characterized as a set of clinical conditions, involving the muscles and joints of the stomatognathic system, commonly associated with chronic pain episodes that occur spontaneously or associated with the activity or load of the stomatognathic system (Kuroiwa *et al.*, 2011). It is known that for the development of TMD it is necessary to have predisposing factors such as deleterious and parafunctional habits, in which bruxism is highlighted, and factors such as abnormality in the physiological processes of growth. The fact that middle-aged women constitute the majority of patients with such disorder, 80%, has been conducting studies to analyze the relationship between TMD and genetic and hormonal factors (Campos *et al.*, 2014). In 2015 a study of 58 educators found that among the most common parafunctional habits, sleeping with a hand under the face presented 33.3%, followed by bruxism / clenching with 26.3%, while the habit of chewing gum accounted for only 7%. Of these, only sleep with the hand under the face and bruxism presented a correlation with the development of temporomandibular dysfunction (Silva *et al.*, 2015). Characterized as cyclical and non-curable, the treatment of

TMDs should aim to maintain control of the symptomatology, with the proviso that when it is erroneously indicated, there may be a worsening of the condition, so a precise diagnosis is necessary and the proposed treatment should consider the condition of the patient's clinical condition (Branco *et al.*, 2018). The clicks caused by bruxism are hardly removed, however, with the removal of the cause a decrease in the frequency and intensity of the same is observed (Ferreira *et al.*, 2009). Patients with daytime bruxism have pain more frequently and / or degenerative changes of the TMJ, while those with nocturnal habits commonly report dislocation of the articular disc alone, or in association with painful symptoms in the facial musculature (Matheuset *et al.*, 2013). In individuals who have chronic clenching, we can observe an increase in friction between the TMJ structures due to a reduction of adequate lubrication, thus suggesting a hypothesis to justify the beginning of the process of joint disc displacement (Branco *et al.*, 2018). In analyzing the stress generated in the condylar structure during a prolonged clenching episode, it was observed that the displacement of the disc directly affects the distribution of stress, specifically in the posterior region, a fact that can produce damages to the cartilage (Koh *et al.*, 2014). One study found that the exacerbated activity of the masticatory muscles might promote the contraction of the tympanic tensor muscle and the tympanic membrane, which could lead to hearing loss and body imbalance (Ré *et al.*, 2009). Patients suffering from chronic TMJ pain report experiences such as sleep disturbances, loss of self-esteem, libido and appetite, fatigue and depression, which interferes with their social life, work performance or even their productive capacity, which is, their quality of life (Blini *et al.*, 2010).

Treatment: The signs and symptoms of tooth clenching should be diagnosed early, considering that some damage may be irreversible (Nishio *et al.*, 2009). The first step is to recognize the problem and try to find its causes in the day-to-day. The most commonly used therapy for relieving signs and symptoms of the temporomandibular joint is the use of interocclusal plaques. These plaques reduce muscle activity and protect the teeth against tooth wear due to tightening (Urban *et al.*, 2009). Treatment consists of therapeutic measures that include medications such as analgesics and anti-inflammatories, myorelaxant occlusal splints, applications of botulinum toxin by the professional and even changes in the individual's behavior. The best results appear after careful evaluation and generally with associated treatments (Ferreira *et al.*, 2009). Currently, botulinum toxin enters as a great ally to the treatment of tooth clenching and TMDs (Kuroiwa *et al.*, 2011). Its mechanism of action promotes the interruption of the passage of the nerve stimulus to the muscle, making it less potent. Thus, it greatly reduces muscle strength and consequently damages to the dental elements, periodontium, bone and TMJ (Torres *et al.*, 2012).

Conclusion

A parafunctional habit such as the clenching of the teeth, which is a complex and multifactorial disorder of unknown etiology, involves a much wider context in the organism. It may represent a predisposing factor as well as an exacerbation of TMD and the development of chronic pain, as well as the consequences on the survival of restorative and rehabilitative treatments. The diagnosis should be made early, mainly because some damage may be irreversible. Treatment requires

the removal of the cause, usually associated with the use of protective measures that minimize hyperactivity, aiming to maintain the integrity of the joint and well-being of patients with TMD.

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