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AXIS FOOT–POSTURE–SPINE–HEAD–MANDIBLE–MANDIBLE: BIOMECHANICAL AND NEUROMUSCULAR CONNECTIONS IN TEMPOROMANDIBULAR DYSFUNCTION

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ABSTRACT

Temporomandibular dysfunction (TMD) is a multifactorial condition that involves musculoskeletal, neuromuscular, postural, and psychosocial factors. Evidence indicates that changes in plantar support and postural control can influence spinal alignment, head position, and the biomechanics of the temporomandibular joint (TMJ) [1,2]. The objective of this study was to analyze, in light of the scientific literature, the biomechanical and neuromuscular interrelations between the functional axis foot–posture–spine–head–jaw and its influence on the etiopathogenesis of TMD. This is a narrative review of the literature, based on studies on posture, cervical spine, muscle chains, and neuromotor control. The findings suggest that distal postural imbalances can generate ascending compensations, modifying cervical and mandibular muscle activity, contributing to the overload of the TMJ [1–4]. It is concluded that a global assessment of the postural system is essential for understanding TMD and for planning integrated therapeutic interventions.

Keywords: Temporomandibular dysfunction; Posture; Cervical spine; Muscle chains; Postural control.

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INTRODUCTION

The temporomandibular joint (TMJ) plays a central role in the functions of chewing, speech, and swallowing, functionally integrating into the craniocervical system [6]. Traditionally, temporomandibular disorders (TMD) have been approached in a segmented manner, focusing on dental occlusion or the joint itself [7]. However, contemporary evidence indicates that the TMJ is part of a broader functional system, in which body posture, neuromuscular control, and balance exert significant influence [1,2].

The human body is organized as an integrated functional unit, in which distal adaptations can generate proximal repercussions and vice versa. In this context, plantar support, spinal orientation, and head positioning are fundamental elements for the balance of the cranio-mandibular system [3,4]. Changes in these components can modify the pattern of muscle activation and the distribution of loads on the TMJ, contributing to the development or maintenance of TMD [1,5].

Thus, understanding TMD from a systemic perspective becomes essential for an effective therapeutic approach. The objective of this study was to analyze the biomechanical and neuromuscular connections between the functional axis foot–posture–spine–head–jaw and its relationship with TMD.

METHODOLOGY

This Is a Narrative Review Of the scientific literature. Databases such as PubMed, SciELO, and Google Scholar were consulted, prioritizing systematic reviews, meta-analyses, and clinical studies on posture, cervical spine, and TMD [1–6]. The inclusion criteria encompassed articles published in Portuguese and English that addressed the relationship between body posture, postural control, and cervical biomechanics cervical and dysfunctions temporomandibular.

RESULTS

The Foot–posture–spine–head–mandible Axis

The concept of the foot–posture–spine–head–mandible axis expresses the

interdependence between support, balance, and motor control systems. The foot is the main interface between the body and the ground, being responsible for capturing proprioceptive stimuli that modulate postural tone [3].

Changes in the plantar support pattern can trigger ascending adaptations along the muscle chains, affecting the alignment of the lower limbs, pelvis, and spine [4]. These modifications impact the cervical region, influencing head position and, consequently, mandibular biomechanics [1,2].

Recent meta-analyses indicate a correlation between body posture and TMD, suggesting that neuromuscular pathways regulate both postural stability and mandibular control [2].

DISCUSSION

Muscle Chains and Myofascial System

The myofascial system constitutes a continuous network of tissues that connects distal and proximal body structures, allowing the transmission of forces and postural adjustments. Changes in these chains can influence head positioning and the activity of the masticatory muscles, favoring joint overload in the TMJ [1,5].

Cervical Spine and Mandibular Control

The cervical spine plays a strategic role in the integration between the trunk and the skull. Systematic reviews indicate an association between cervical postural changes and TMD, although the methodological quality of the studies varies [1]. Clinical studies also suggest a bidirectional relationship between cervical dysfunctions, inadequate posture, and orofacial pain [4,5].

Clinical Implications

Patients with TMD often present global postural imbalances, cervical pain, and changes in motor control [3,4]. This reinforces the understanding of TMD as an expression of a systemic adaptive pattern, rather than as an isolated local dysfunction.

Integrated Therapeutic Approach

Recent reviews recommend that the management of TMD includes cervical and body postural assessment, associated with interventions physiotherapeutic, postural training, and a multiprofessional approach [3–6].

CONCLUSION

Temporomandibular dysfunction is a multifactorial condition influenced by biomechanical and neuromuscular changes in the global postural system. Scientific evidence indicates that imbalances in the foot–posture–spine–head–jaw axis can

contribute to the overload of the TMJ and the perpetuation of symptoms. Integrated, evidence-based assessment is essential for more effective and individualized interventions.

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