Immediate Changes in Masticatory Mechanosensitivity, Mouth Opening, and Head Posture After Myofascial Techniques in Pain-Free Healthy Participants: A Randomized Controlled Trial

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Abstract

Objective: This study aimed to assess the immediate effects on masticatory muscle mechanosensitivity, maximal vertical mouth opening (VMO), and head posture in pain-free healthy participants after intervention with myofascial treatment in the temporalis and masseter muscles.

Methods: A randomized, double-blind study was conducted. The sample group included 48 participants (n = 48), with a mean age of 21 ± 2.47 years (18-29). Two subgroups were defined: an intervention group (n = 24), who underwent a fascial induction protocol in the masseter and temporalis muscles, and a control group (n = 24), who underwent a sham (placebo) intervention. The pressure pain threshold in 2 locations in the masseter (M1, M2) and temporalis (T1, T2) muscles, maximal VMO, and head posture, by means of the craniovertebral angle, were all measured.

Results: Significant improvements were observed in the intragroup comparison in the intervention group for the craniovertebral angle with the participant in seated ($P < .001$; $F_{1,23} = 16.45$, $R^2 = 0.41$) and standing positions ($P = .012$, $F_{1,23} = 7.49$, $R^2 = 0.24$) and for the pressure pain threshold in the masticatory muscles, except for M2 ($P = .151$; M1: $P = .003$; $F_{1,23} = 11.34$, $R^2 = 0.33$; T1: $P = .013$, $F_{1,23} = 7.25$, $R^2 = 0.23$; T2: $P = .019$, $F_{1,23} = 6.41$, $R^2 = 0.21$). There were no intragroup differences for the VMO ($P = .542$). Nevertheless, no significant differences were observed in the intergroup analysis in any of the studied variables ($P > .05$).

Conclusion: Myofascial induction techniques in the masseter and temporalis muscles show no significant differences in maximal VMO, in the mechanical sensitivity of the masticatory muscles, and in head posture in comparison with a placebo intervention in which the therapist's hands are placed in the temporomandibular joint region without exerting any therapeutic pressure. (J Manipulative Physiol Ther 2013;36:310-318)

Key Indexing Terms: *Head; Manual Therapy; Masticatory Muscles; Pain Threshold; Posture*

Temporomandibular disorders (TMDs) have been related to dysfunctions from neighboring segments (the cervical spine, for instance)[1] and other regions of the body.[2,3] The relationship between head and neck posture and the temporomandibular joint (TMJ) has been widely discussed in the scientific literature.[4] Any variation

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in craniomandibular biomechanics may potentially change the growth, statics, and dynamics of the participant.[5] Besides, a dysfunction of the masticatory muscles has also been associated with a higher incidence of craniofacial pain syndromes.[6]

Use of manual therapy for TMJ disorders has become increasingly relevant in the clinical setting. There have been many proposals of interventions since manual therapy was suggested for the temporomandibular area. The approach to the joint complex includes a wide range of articular, structural, and/or muscular techniques, among others.[7] Some of them have demonstrated to be effective. However, some may be painful for the patient, such as ischemic compression techniques,[8] or be seen as aggressive or invasive, and some, including spinal manipulation, have had occasional reported adverse effects.[9,10]

Myofascial induction techniques are noninvasive therapeutic procedures, purported to cause no adverse reactions,[11] and they are widely used in daily practice in the field of manual therapy.[12] Moreover, these techniques have shown a positive repercussion on local tissues[13,14] as well as on general aspects of the organism, by reducing the levels of anxiety[15] and the variability of cardiac rate.[16]

The fascial system is a continuous net divided into different compartments that separate and support all body parts. Thus, any functional limitation in a specific region will have an effect on the whole system.[11] Relaxation through induction techniques that release fascial tissue can consequently be transmitted via the fascial system to distal areas.[2] Saíz Llamosas et al[13] recommended that researching with these therapeutic maneuvers should start in pain-free participants who do not have central or peripheral sensitization processes. Sensitization operates after nociceptive stimuli. Hence, new conservative, analgesic, and gentle therapeutic approaches should be evaluated.[17]

The aim of this study was to assess if a protocol of myofascial induction intervention in the masseter and temporalis muscles has an immediate impact on several aspects of craniomandibular functionality, such as follows: (*a*) maximal amplitude of vertical mouth opening (VMO) with the participant seated and laying down, (*b*) head posture with the participant seated and standing still, and (*c*) mechanical sensitivity of the masseter and temporalis muscles.

Methods

Design and Participants

Based on a nonprobabilistic convenience sampling, one researcher selected 48 participants with ages between 18 and 29 years (mean age, 21 ± 2.47 years). Participants were recruited from the University of Sevilla, where the study took place. The participants were distributed, by means of a randomized number table designed by an external online company (randomized.com), into a control group (CG; n = 24) and an intervention group (IG; n = 24). The study was conducted according to the ethical principles of the Helsinki Declaration (2008 revision) and received the approval of the Ethical Committee on Research of the University of Sevilla (Spain). It was subsequently registered in the Australian and New Zealand Clinical Trial Registry, with registry number ACTRN 12612000733875.

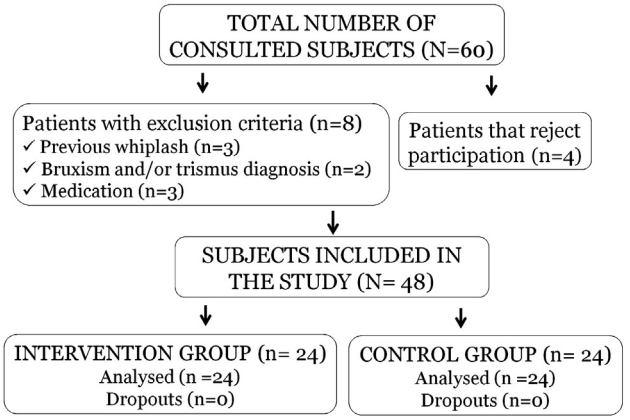

Fig 1. *Flowchart of the studied participants in the selection process, data collection, and analysis of the results.*

The study was a double-blind protocol (evaluators and participants were unaware of the aims of the research). Sample size calculation was made based on a previous pilot study, taking into account a 1-tailed hypothesis, a large effect size (d = 0.8), an α value of .05, and an 80% statistical power. Thus, 21 participants per group were necessary to complete the study (software: Gpower 3.1.2; Kiel University, Kiel, Germany). Established inclusion criteria were as follows: (i) age between 18 and 30 years; (ii) absence of symptoms in the cervical spine, TMJ, upper limbs, and craniofacial area within the 4 weeks before data collection, by means of asking about the prevalence of pain, discomfort, or functional limitation in the above-mentioned regions; and (iii) willingness to participate in the research confirmed by filling in a written informed consent form. Likewise, participants with any of the following characteristics were excluded from the study: (i) medical diagnosis of TMD and/or mandibular parafunctions (bruxism and/or trismus); (ii) previous whiplash; (iii) fractures and/or surgery in the cranial vault, craniofacial region, and/or any spinal level; (iv) degenerative, systemic, rheumatic, and/or tumoral diseases; (v) medicine intake in the 72 hours before measurements; and (vi) having received soft tissue therapy within the year before the study. Figure 1 shows the flowchart of the studied participants during the selection process, data collection, and posterior analysis.

Measurement protocol was conducted by 2 therapists before and after intervention in both study groups. The evaluators had been previously trained in managing the assessment tools (algometry, digital caliper, and photo-