Effect of Adding Interferential Current in an Exercise and Manual Therapy Program for Patients With Unilateral Shoulder Impingement Syndrome: A Randomized Clinical Trial

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Abstract

Objective: The purpose of this study was to measure the additional effect of adding interferential current (IFC) to an exercise and manual therapy program for patients with unilateral shoulder impingement syndrome.

Methods: Forty-five participants were randomly assigned to group 1 (exercise and manual therapy), group 2 (exercise and manual therapy + IFC), or group 3 (exercise and manual therapy + placebo ultrasound). Individuals participated in 16 treatment sessions, twice a week for 8 weeks. The primary outcome of the study was total score of the Shoulder Pain and Disability Index (SPADI). The secondary outcomes were the pain and disability subscales of SPADI, Numeric Rating Scale, and Pain-Related Self-Statement Scale. Adjusted between-group mean differences (MDs) and 95% confidence intervals (CIs) were calculated using linear mixed models.

Results: After 16 treatment sessions, statistically significant but not clinically important differences were identified in favor of the exercise and manual therapy program alone in the SPADI-total (group 1 vs group 2, MD 11.12 points, 95% CI 5.90-16.35; group 1 vs group 3, MD 13.43 points, 95% CI 8.21-18.65). Similar results were identified for secondary outcomes.

Conclusion: The addition of IFC does not generate greater clinical effects in an exercise and manual therapy program for individuals with unilateral shoulder impingement syndrome. (J Manipulative Physiol Ther 2018;xx:1-9)

Key Indexing Terms: *Shoulder Pain; Physical Therapy Modalities; Musculoskeletal Pain*

Introduction

Nontraumatic shoulder pain related to the compromise of structures in subacromial space is one of the most common musculoskeletal complaints and is termed shoulder impingement syndrome (SIS).[1] There have been constant updates of this dysfunction over the years in terms of the understanding of its pathobiomechanics.[2-7] Several authors strongly question the terminology of SIS because it refers only to the mechanical mechanism that generates compression in the tendons of the rotator cuff.[8,9] Thus, it is now accepted that there are multiple internal pathophysiological mechanisms that may reduce the potential space for rotator cuff tendons in the subacromial space.[6-10]

In this way, SIS terminology should be considered an umbrella term, not specific, that includes multiple diagnoses, even intrinsic, involving partial tears of rotator cuff tendons, involvement of the long head of biceps, bursal inflammation, and structural abnormalities at the level of the acromial arch,[8] related to alterations in glenohumeral and scapulothoracic kinematics, capsular laxity or tightness, and muscle imbalances of the rotator cuff and scapular muscles.[11-14]

Reported prevalence for shoulder pain in general is contradictory. However, with regard to SIS, the most common figure is 36% among shoulder diseases, being

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characterized with the most prevalent painful shoulder conditions.[15]

When planning rehabilitation programs involving patients with SIS or shoulder pain, interferential current (IFC) is one of the routinely chosen resources for pain relief.[12,16] It is characterized as an electroanalgesic resource and is based on the application of alternating medium-frequency current (4000 Hz) with amplitude modulated at low frequency (0-250 Hz).[17] As a probable benefit from the use of IFC, the literature highlights the decrease in the impedance offered by the skin during the application and the greater depth reached in the target area of treatment, resulting in a more effective analgesia for the patient.[17,18]

Despite the promising effects conceptually related to the use of IFC, its use alone is not better than placebo or other therapies. However, considering the clinical heterogeneity and populations studied, IFC administration in a multimodal therapeutic approach appears to be more effective in reducing pain than control treatments and more effective than placebo.[17]

Thus, the present study was justified because, despite some recent studies having used IFC to treat shoulder disabilities,[18-22] the results presented by these randomized clinical trials were not fully elucidative in supporting the use of IFC for shoulder disabilities because they did not exhaust all the possibilities on its use for this condition, especially the additional analgesic effect of IFC in an exercise and manual therapy program (ie, in multimodal treatment).[17]

In light of the aforementioned statements, the aim of the present study was to measure the effect of adding IFC in an exercise and manual therapy program for patients with unilateral SIS. The hypothesis of the study was that the insertion of IFC into an exercise and manual therapy program for these patients would be more effective than the isolated use of these therapeutic resources.

Methods

Ethics

The study was conducted in the integrated health clinic of the Nove de Julho University (São Paulo, SP, Brazil), between January 2016 and January 2017. The study procedures were approved by the Research Ethics Committee of this institution, under protocol number 51675615.3.0000.5511 and registered in ClinicalTrials.gov (NCT029648819). Participants were recruited by means of telephone contact for patients on the same institution's treatment waiting. All individuals included in the study validated their participation by signing an informed consent form.

Study Design

This study was a prospective, 3-arm, randomized, placebo-controlled trial with blinded participants and examiner. Thus, 1 researcher was responsible for recruitment, assessment, and confirmation of the eligibility criteria; a second realized the randomization and concealed allocation; 3 other physiotherapists conducted the application of the treatment programs; and another processed and analyzed the collected data. The researcher responsible for randomization and concealed allocation did not participate of this investigation nor had knowledge about the characteristics of the research.

Individuals were randomly assigned into one of the following groups: group 1 (exercise and manual therapy), group 2 (exercise and manual therapy + IFC), or group 3 (exercise and manual therapy + placebo ultrasound). Concealed allocation of individuals was carried out with opaque envelopes, sealed, sequentially numbered, and randomly assigned by a computer-generated table of random numbers. On the first day of treatment, the envelopes were opened by the physiotherapist responsible for the application of the treatment programs.

Sample

Sample calculation processing was conducted with Ene software, Version 3.0 (Autonomous University of Barcelona, Barcelona, Spain). The sample size was calculated based on a clinical trial conducted by Pekyavas and Baltac.[23] The calculation was performed to detect the difference between groups of 15.93 points in the Shoulder Pain and Disability Index (SPADI), assuming a standard deviation of 13.15 points. The resulting sample size was 12 participants. To compensate for possible sample losses, 15 participants per group were included in this study.

Both men and women between the ages of 18 and 60 years and with a history of anterolateral and unilateral pain in the shoulder for more than 3 months were recruited. In addition, the included participants presented a report issued by the orthopedic doctor confirming the diagnosis, with a minimum score of 4 points on the Numeric Pain Rating Scale (NRS) at rest or during active shoulder movement, and positivity on at least 2 of 3 orthopedic tests for SIS: Neer, Hawkins, and Jobe.[24]

The exclusion criteria adopted in this study were as follows: individuals who presented functional limitation that would make it impossible to carry out fundamental movements for the proposed treatments; signs and symptoms of numbness or tingling in the upper limb; history of shoulder trauma; muscle injury in the upper limb; other diseases related to the shoulder; ruptured tendons; ligamentous laxity; history of shoulder and/or cervical surgery; use of corticosteroid injection in the shoulder or use of analgesic, anti-inflammatory, or muscle relaxants in the last 3 months; performing or having undergone physiotherapeutic treatment in the last 3 months.

Assessment Procedures

The assessments took place before the first treatment session, immediately after the first treatment session (only NRS), after 16 treatment sessions, and 4 weeks after the end of the sessions (only NRS). Thus, 4 weeks after the last session,