

# Combined Use of Diadynamic Currents and Manual Therapy on Myofascial Trigger Points in Patients With Shoulder Impingement Syndrome: A Randomized Controlled Trial

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## ABSTRACT

**Objective:** The purpose of this study was to evaluate the effect of combined manual therapy (MT) and diadynamic (DD) currents on myofascial trigger points of the upper trapezius muscle in individuals with a diagnosis of unilateral shoulder impingement syndrome.

**Methods:** A randomized clinical trial was conducted involving 60 individuals with shoulder impingement syndrome who were allocated to the following 3 groups: (1) MT and DD currents (MTDD), (2) MT alone, and (3) DD currents alone. The participants were submitted to 16 treatment sessions over an 8-week period and were evaluated using the Numerical Rating Pain Scale as well as the pain and disability subscales of the Shoulder Pain and Disability Index.

**Results:** Differences in Numerical Rating Pain Scale scores (secondary outcome) between MTDD and MT groups (mean difference 2.25 points, 95% confidence interval 1.07-3.42) and between MTDD and DD groups (mean difference 2.30 points, 95% confidence interval 1.42-3.17) were clinically relevant. No clinical gains were observed in the comparisons between groups of Shoulder Pain and Disability Index scores.

**Conclusion:** The combination of MT and DD currents on myofascial trigger points was more effective at reducing pain intensity but not disability than each therapy performed individually for patients with unilateral shoulder impingement syndrome. (*J Manipulative Physiol Ther* 2018;xx:1-8)

**Key Indexing Terms:** *Shoulder Pain; Physical Therapy Modalities; Myofascial Pain Syndromes; Physical and Rehabilitation Medicine*

## INTRODUCTION

Shoulder impingement syndrome is a condition that causes shoulder pain.<sup>1</sup> With a multifactor etiology,

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Paper submitted March 22, 2017; in revised form October 26, 2017; accepted October 26, 2017.

0161-4754

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<https://doi.org/10.1016/j.jmpt.2017.10.017>

shoulder impingement syndrome is considered a nonspecific term that envelopes different mechanisms and has a broad gamut of diagnoses.<sup>2-4</sup> This condition leads to altered motor control, tightness of muscles and other soft tissue structures around the shoulder, postural deviations, and muscle imbalances.<sup>1</sup>

Muscle involvement in shoulder impingement syndrome<sup>5,6</sup> favors the emergence of myofascial trigger points, especially in the infraspinous and upper trapezius muscles.<sup>7</sup> Myofascial trigger points are palpable nodules located in a taut band of a skeletal muscle and are related to sensory, motor, and autonomic changes with the presence of local pain.<sup>8</sup> Such structures may be active (presence of spontaneous pain or pain reported as familiar through compression) or latent (nonspontaneous and patient reports unknown pain through local compression).<sup>9,10</sup>

A recent review of the literature reports that dry and wet needling, myofascial manipulation, ischemic compression, low-level laser therapy, manual muscle stretching, cold application, home exercises, and ergonomic recommendations are among the different treatments for reducing pain, increasing range of motion, and improving shoulder function in individuals with shoulder impingement syndrome and myofascial trigger points.<sup>11</sup> Moreover, positional release and ischemic compression are a part of a set of manual therapies that employ specialized movements of the hands over the myofascial component, both of which are used to reduce pain and improve function.<sup>12,13</sup> Specifically, with regard to myofascial trigger points, these 2 techniques can raise the pressure pain threshold and improve the range of motion of the joint.<sup>14</sup>

The aim of electrophysical agents is to reduce pain and improve function through the administration of a particular amount of energy (electrical, sound, light, or thermal) to target tissues;<sup>12</sup> although, such methods do not have the same quantity and quality of clinical studies in comparison to manual techniques.<sup>15</sup> The present investigation highlights diadynamic (DD) currents (low frequency currents), which promote analgesic effects founded on the gate control theory of pain and the release of endorphins.<sup>16</sup> Such currents can even be employed for chronic conditions, leading to improvements with regard to functional aspects.<sup>17</sup>

Despite the close relationship between myofascial trigger points and shoulder impingement syndrome, the scientific literature offers only a small number of systematic reviews that present evidence for the use of physiotherapeutic resources in these clinical situations, with only dry and wet needling recommended for the short-term and medium-term relief of pain caused by trigger points in the neck and shoulder in comparison to a control group or individuals submitted to sham treatment.<sup>18</sup> Thus, a larger number of randomized clinical trials with due methodological quality will lead to a greater number of resources that are proven effective for use by physiotherapists in the treatment of these clinical conditions.

The purpose of the present study was to evaluate the effects of manual therapy (MT) and DD currents on myofascial trigger points of the upper trapezius muscle in individuals with a diagnosis of unilateral shoulder impingement syndrome. The hypothesis is that the combination of these 2 physiotherapeutic resources leads to greater improvements in patients with shoulder impingement syndrome than each resource employed separately.

## METHODS

### Ethical Aspects

Eligible participants were informed beforehand regarding the evaluation procedure that they were to be submitted and signed a statement of informed consent formulated in

accordance with Resolution 466/12 of the Brazilian National Health Council and the 1975 Declaration of Helsinki. The procedures of the present study received approval from the Research Ethics Committee of the Nove de Julho University under process number 50917515.3.0000.5511. This study is registered with [ClinicalTrials.gov](http://ClinicalTrials.gov) (NCT02735967).

### Design

A prospectively registered, three-arm, randomized, controlled trial with a blinded examiner was conducted at a physical therapy clinic in the city of São Paulo, Brazil between January 2016 and July 2016. A researcher who was blinded to the allocation of the participants was in charge of performing the evaluation of the participants to determine their eligibility. This evaluation comprised an interview addressing a detailed medical history and a physical examination of the affected shoulder.

The participants were randomly allocated to 3 treatment groups by means of a scheme generated by computer: MT and DD currents (MMDD), MT alone, or DD alone. Concealed allocation was performed using sequentially numbered, sealed, opaque envelopes. This procedure was conducted by an investigator who was not involved in the recruitment or treatment of the participants.

Three physiotherapists (1 for each group) with at least 2 years of experience were designated to perform the therapeutic procedures. All physiotherapists first underwent a 2-month training period to ensure the standardization of the administration of the DD currents and MT program.

On the first day of treatment, the envelope attributed to the participant was opened by the researcher in charge of the intervention in the respective groups. The participants were informed that they would receive care involving the administration of DD currents, MT, or both. Thus, due to the nature of the interventions, it was not possible to blind the researchers in charge of the procedures or the participants.

### Participants

All participants in the present study were on a waiting list at a physical therapy clinic in the city of São Paulo and were formally invited to participate through contact by telephone. The inclusion criteria were age 18 to 59 years; a history of anterolateral, unilateral shoulder pain (minimum intensity of 4 points on the Numerical Rating Pain Scale [NRPS]) for at least 3 months, and a positive result on at least 2 of the 3 orthopedic tests for impingement syndrome: Neer, Hawkins, and Jobe. Moreover, the volunteers needed to have active, unilateral myofascial trigger points in the upper trapezius muscle on the same side as the affected shoulder.<sup>8,19,20</sup>

The diagnosis of myofascial trigger points was performed by a researcher with more than 3 years of experience

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