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ORIGINAL RESEARCH

Is Interferential Current Before Pilates Exercises More Effective Than Placebo in Patients With Chronic Nonspecific Low Back Pain?: A Randomized Controlled Trial

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Abstract

Objective: To determine whether interferential current (IFC) before Pilates exercises is more effective than placebo in patients with chronic nonspecific low back pain.

Design: Two-arm randomized controlled trial, with a blinded assessor, and 6 months follow-up.

Setting: Clinic of a school of physical therapy.

Participants: The random sample consisted of patients (N = 148) of both sexes, with age between 18 and 80 years and chronic nonspecific low back pain. In addition, participants were recruited by disclosure of the treatment in the media.

Interventions: Patients were allocated into 2 groups: active IFC + Pilates or placebo IFC + Pilates. In the first 2 weeks, patients were treated for 30 minutes with active or placebo IFC. In the following 4 weeks, 40 minutes of Pilates exercises were added after the application of the active or placebo IFC. A total of 18 sessions were offered during 6 weeks.

Main Outcome Measures: The primary outcome measures were pain intensity, pressure pain threshold, and disability measured at 6 weeks after randomization.

Results: No significant differences were found between the groups for pain (0.1 points; 95% confidence interval, −0.9 to 1.0 points), pressure pain threshold (25.3kPa; 95% confidence interval, −4.4 to 55.0kPa), and disability (0.4 points; 95% confidence interval, −1.3 to 2.2). However, there was a significant difference between baseline and 6-week and 6-month follow-ups in the intragroup analysis for all outcomes ($P<.05$), except pressure pain threshold in the placebo IFC + Pilates group.

Conclusions: These findings suggest that active IFC before Pilates exercise is not more effective than placebo IFC with respect to the outcomes assessed in patients with chronic nonspecific low back pain.

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Nonspecific chronic low back pain (CLBP) is described as mechanical musculoskeletal pain lasting >12 weeks without known cause.[1,2] With a global prevalence of 31%,[3] nonspecific CLBP is among the 4 most common diseases in the world.[4] It is a disease with great socioeconomic impact,[5] which warrants the search for more effective treatment methods, especially given the minor effects of most current treatments. Nonspecific CLBP has a moderately favorable prognosis, with 41% of patients recovering after 12 months.[6]

The guidelines of clinical practice recommend supervised exercise as the best treatment for nonspecific CLBP.[1,7] Trunk muscle exercises, such as aerobic, motor control, strength, and resistance exercises, and directional preference exercises that

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promote the centralization of symptoms are recommended.[1,7] One type of exercise available to physical therapists is the Pilates method,[8] which is more effective than routine care and maintenance of physical activity at improving pain and disability in the short term, with clinically significant pain improvement.[9] However, these improvements are similar to different forms of exercise and therapeutic massage.[9]

Analgesic electrical currents, including interferential current (IFC), can be used as adjuvant in the treatment of nonspecific CLBP,[10-15] because of pain reduction in the short term.[12,16-18] IFC is a medium-frequency alternating current with amplitude modulated at low frequency.[19] There are 2 hypotheses to explain pain reduction: the release of endogenous opioids[20-24] and the gate control theory of pain.[25] A systematic review[26] concluded that IFC combined with massage, traction, and horizontal therapy (ie, a medium-frequency current with a stimulation frequency oscillating at 100Hz between 4,400 and 12,300Hz)[13] is more effective than placebo horizontal therapy in the treatment of patients with chronic diseases. However, studies that used IFC in the treatment of nonspecific CLBP did not compare its efficiency with placebo IFC.[26]

The Pilates method has a certain degree of difficulty, and patients with nonspecific CLBP may find it even more difficult to perform the exercises because of the pain and fear of a new painful episode.[27] The use of IFC before exercise could facilitate performance and increase its efficiency, improving the clinical condition of patients with nonspecific CLBP. To date, no studies assessed whether the use of IFC before exercise therapy can lead to longer-lasting results in the treatment of nonspecific CLBP. Therefore, the objectives of this study were to determine whether the association of IFC with Pilates exercise is more effective than placebo current in improving pain intensity, pressure pain threshold (PPT), general and specific disability, global perceived effect, and kinesiophobia in patients with nonspecific CLBP in the short and medium term.

Methods

Study design

The study design was a 2-arm randomized controlled trial with a blinded assessor.

Ethics committee and funding

The study was approved by the Research Ethics Committee of Universidade Cidade de São Paulo (process no. 18034113.7.0000.0064), and the protocol was published previously.[28]

Location

The treatment was carried out at the clinic of the School of Physical Therapy of Universidade Cidade de São Paulo, São Paulo, Brazil, between October 1, 2013, and June 27, 2014.

List of abbreviations:

CLBP chronic low back pain
IFC interferential current
PPT pressure pain threshold

Participants

Patients of both sexes were included according to the following criteria: nonspecific CLBP for at least 3 months; age between 18 and 80 years; nonathletes; and pain intensity ≥ 3.[29] The exclusion criteria were as follows: contraindication to physical exercise[30]; pregnancy; serious spinal disorder; nerve root compromise; changes to sensitivity, allergy, skin infection, and/or lesion in the area of application of the current; cancer; pacemaker; previous spinal surgery; physical therapy treatment for nonspecific CLBP in the last 6 months; and regular practice of Pilates.

Randomization and concealed allocation

A researcher not involved with data collection performed the randomization using random number generation in Microsoft Excel for Windows.[a] The allocation was concealed in sequentially numbered opaque sealed envelopes. After the assessment, the eligible patients were randomly allocated into the treatment groups by the physical therapists responsible for electrotherapy.

Interventions

The treatment groups consisted of active IFC + Pilates group, who received active IFC plus Pilates exercise program; and placebo IFC + Pilates group, who received placebo IFC plus Pilates program. Eighteen treatment sessions were offered, distributed over 6 weeks, 3 times a week. In the first 2 weeks, participants were submitted only to active or placebo IFC for 30 minutes to promote prior pain reduction that could facilitate exercise and in an attempt to obtain a possible cumulative analgesic effect.[31] During the 4 weeks, after electrotherapy, participants had additional Pilates sessions of 40 minutes.

For electroanalgesia, we used a device that produces medium-frequency alternating currents (Neurovector[b]). Both groups received bipolar (premodulated) application with 2 channels at the site of pain,[32] with parameters described previously.[10,28] Electrotherapy was performed by 2 physical therapists other than the ones who did the Pilates treatment. In the active IFC + Pilates group, the current amplitude was increased until the participant reported a strong but comfortable tingling sensation, and this procedure was repeated every 5 minutes.[33] In the placebo IFC + Pilates group, the device was on and all the parameters were adjusted as in the active IFC + Pilates group, but the current amplitude did not reach the treated area. Every 5 minutes, the physical therapist asked the participant if he was comfortable without increasing the current amplitude. To indicate the end of the application, the device made the same sound as the active current. Patients were informed that they may feel some tingling, vibration, or absolutely nothing during current's application.

From the third week, both groups were submitted to the Pilates program, with exercises on the mat and on the Cadillac, Reformer, Ladder Barrel, and Step Chair machines.[c] Initially the patient was trained to isometrically contract the powerhouse muscles (eg, transversus abdominis, multifidus, and pelvic floor muscles) during exhalation, and then he/she was instructed to hold this contraction during all exercises to stabilize the spine.[34,35] The level of difficulty and the patient's preferences in relation to the exercises were individualized.[28,36,37] Ten repetitions of each exercise were performed.[38,39] The Pilates intervention was supervised by 2 physical therapists with 5 years of experience with the method. They were blinded to the type of electrotherapy that the participant received before the exercises.