Effect of Interferential Current in the Management of Musculoskeletal Pain: A Systematic Review

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INTRODUCTION

Interferential current (IFC) is widely used in conjunction with other therapies to manage musculoskeletal pain. IFC uses two medium frequency carrier currents which interfere deeper in tissues, producing an amplitude modulated frequency (AMF). The interference creates the effect of low frequency stimulation with less discomfort for patients compared to direct low frequency stimulation. The predominant proposed mechanisms of analgesia include the gate control theory of pain and endogenous opioid production. Since previous systematic reviews have found a lack of studies examining the independent treatment effects of IFC, this study reviewed the isolated effects of IFC compared to control groups.

PURPOSE

The purpose of this study was to conduct a systematic review of existing literature addressing the potential effectiveness of IFC as an adjunctive biophysical agent for treating musculoskeletal pain.

METHODS

CINAHL, PubMed, Cochrane Library, PEDro, SportDISCUS, and CENTRAL were searched between November 2016 and February 2017 with the following terms: interferential current, interferential therapy, interferential electrical stimulation, pain, and analgesia. Articles met inclusion criteria if they were randomized controlled trials (RCT) that had IFC as an intervention and an assessment of pain as an outcome measure. Studies were excluded if they were duplications, had a publication date prior to 2009, were not published in English, used thermal induced pain in healthy subjects, if the effects of IFC were not tested in isolation of other treatments, or if no form of a control group was used.

RESULTS

The initial search yielded 285 results with 10 eligible studies adhering to inclusion and exclusion criteria, published from 2011-2016. Participants across studies included healthy individuals with experimentally induced pain and patients with the following diagnoses: chronic low back pain, carpal tunnel syndrome, shoulder hemiplegia, and knee osteoarthritis. Outcome measures included subjective pain reports such as the visual analog scale (VAS) or the numeric pain rating scale, objective physiological measurements such as pain-free ROM or a 15 meter walk test, pain behavior assessments such as medication use, and functional outcome measures such as the Roland Morris Disability Questionnaire (RMDQ) or the numeric rating scale (pain intensity at rest).

Table 1: Study Characteristics

<table>
<thead>
<tr>
<th>Study Characteristics</th>
<th>Number of Participants</th>
<th>Treatment Population</th>
<th>Test Groups</th>
<th>Outcome Measures</th>
<th>Key Findings</th>
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<td>Chen et al, 2014</td>
<td>Parallel RCT</td>
<td>32</td>
<td>IFC (Placebo)</td>
<td>Pain VAS, Numeric Rating Scale</td>
<td>IFC significantly improved pressure pain threshold and temporal summation of pain measures.</td>
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<td>Facci et al, 2011</td>
<td>Parallel RCT</td>
<td>150</td>
<td>CLBP</td>
<td>Pain VAS, Numeric Rating Scale</td>
<td>IFC was significantly more effective than placebo at reducing pain intensity and pain pressure threshold.</td>
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<td>Koca et al, 2015</td>
<td>Parallel RCT</td>
<td>16</td>
<td>IFC (Placebo)</td>
<td>Pain VAS, Numeric Rating Scale</td>
<td>IFC was significantly more effective than placebo at reducing pain intensity.</td>
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<tr>
<td>Nguyen et al, 2017</td>
<td>Parallel RCT</td>
<td>75</td>
<td>IFC (Placebo)</td>
<td>Pain VAS, Numeric Rating Scale</td>
<td>IFC was significantly more effective than placebo at reducing pain intensity.</td>
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<td>Simon et al, 2015</td>
<td>Parallel RCT</td>
<td>8</td>
<td>IFC (Placebo)</td>
<td>Pain VAS, Numeric Rating Scale</td>
<td>IFC was significantly more effective than placebo at reducing pain intensity.</td>
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<tr>
<td>Smith et al, 2016</td>
<td>Parallel RCT</td>
<td>80</td>
<td>IFC (Placebo)</td>
<td>Pain VAS, Numeric Rating Scale</td>
<td>IFC was significantly more effective than placebo at reducing pain intensity.</td>
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<td>Correa et al, 2014</td>
<td>Parallel RCT</td>
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<td>IFC (Placebo)</td>
<td>Pain VAS, Numeric Rating Scale</td>
<td>IFC was significantly more effective than placebo at reducing pain intensity.</td>
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<td>Fuentes et al, 2011</td>
<td>Randomized Crossover</td>
<td>40</td>
<td>Healthy</td>
<td>Pain VAS, Numeric Rating Scale</td>
<td>IFC was significantly more effective than placebo at reducing pain intensity.</td>
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DISCUSSION

In this systematic review, including 10 randomized controlled trials, totaling 898 participants, IFC was found to be effective in the immediate management of musculoskeletal pain. Carrier frequency, as opposed to AMF, may be the more dominant analgesic parameter. Four thousand Hz is the most commonly used carrier frequency. All studies included that used a carrier frequency of 4,000 Hz reported a significant improvement in pain or a decrease in use of pain medication. One RCT reported no significant effect of IFC when using a carrier frequency of 2,000 Hz. Four of the 10 RCTs evaluated long-term effects: three RCTs found significant lasting benefits, while one RCT found no significant long term improvements.

CONCLUSIONS

The reviewed studies support use of IFC in the treatment of musculoskeletal pain. More research is needed to determine the optimal parameters and evaluate long-term effectiveness.

CLINICAL RELEVANCE

Current evidence supports utilization of IFC as an effective adjunctive therapy for acute/intermittent intervention in the short-term management of musculoskeletal pain, which may help improve functional outcomes and reduce patient use of pain medications.