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Effectiveness of Exercise Training for Pain Reduction in Adults With and Without Pain: A Systematic Review and Network Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - No financial support.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 05 November 2023 and was last updated on 05 November 2023.

INTRODUCTION

Review question / Objective The purpose of this network meta-analysis was to analyze the relative effects of different types of exercise in adults with and without pain.

Condition being studied Exercise-induced hypoalgesia (EIH) is a reduction in pain that occurs during or following exercise. Conventional meta-analyses established that exercise interventions appear to affect pain intensity when separately compared with usual care. However, there are relatively few conventional meta-analyses focus on single comparisons rather than on a simultaneous analysis of exercise treatment that would allow rank ordering of their effectiveness.

METHODS

Participant or population Adults with and without pain.

Intervention Aerobic, dynamic, isometric, anaerobic exercise, and TENS added to exercises.

Comparator No exercise control group.

Study designs to be included Randomized controlled trials and single group studies.

Eligibility criteria Study design: Crossover or parallel randomized controlled trials (RCTs) and single-group studies conducted exclusively in the English language. Population: Adult participants (>18 years old) with or without any type of chronic

pain. Intervention: Our study encompassed trials that compared interventions involving a combination of aerobic, dynamic, isometric, anaerobic exercises, and TENS, in addition to exercises, against a control group receiving usual care. The usual-care control group will be no treatment and relevant active interventions. Trials incorporating a placebo-based intervention or sham treatment were included. Comparator: A control condition (e.g., non-exercise control or sham exercise). Outcomes: This study assess pain before and after exercise through pressure pain thresholds. Outcomes are presented as the minimum mechanical force required to induce pain. Study design: Crossover or parallel randomized controlled trials (RCTs) and single-group studies conducted exclusively in the English language. Population: Adult participants (>18 years old) with or without any type of chronic pain. Intervention: Our study encompassed trials that compared interventions involving a combination of aerobic, dynamic, isometric, anaerobic exercises, and TENS, in addition to exercises, against a control group receiving usual care. The usual-care control group will be no treatment and relevant active interventions. Trials incorporating a placebo-based intervention or sham treatment were included. Comparator: A control condition (e.g., non-exercise control or sham exercise). Outcomes: This study assess pain before and after exercise through pressure pain thresholds. Outcomes are presented as the minimum mechanical force required to induce pain. Additionally, the time it took for the subject to perceive the stimulus as painful and the level of minimal perceived pain were measured. These assessments were recorded using a pressure and pain rating instrument, with measurements recorded in various units such as Kpa, Kg, seconds, and a visual analogue scale.^{5,6} Pre-exercise assessments of pain must be made within 60 minutes of the start of exercise. . It is not permissible to conduct pre-exercise assessments in a separate session, such as a baseline familiarization or control session. Similarly, post-exercise pain assessments must be carried out within 60 minutes of the exercise's conclusion. Study design: Crossover or parallel randomized controlled trials (RCTs) and single-group studies conducted exclusively in the English language. Population: Adult participants (>18 years old) with or without any type of chronic pain. Intervention: Our study encompassed trials that compared interventions involving a combination of aerobic, dynamic, isometric, anaerobic exercises, and TENS, in addition to exercises, against a control group receiving usual care. The usual-care control group will be no

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Information sources In our search, we researched various databases, including MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL), and the Physiotherapy Evidence Database (PEDro). We used specific keywords such as aerobic, dynamic, isometric, anaerobic exercise, and TENS, in conjunction with exercises, or relevant related terms. We conducted a literature search to identify relevant studies published to 31 December 2022.

Main outcome(s) This study assess pain before and after exercise through pressure pain thresholds. Outcomes are presented as the minimum mechanical force required to induce pain. Additionally, the time it took for the subject to perceive the stimulus as painful and the level of minimal perceived pain were measured. These assessments were recorded using a pressure and pain rating instrument, with measurements recorded in various units such as Kpa, Kg, seconds, and a visual analogue scale. Pre-exercise assessments of pain must be made within 60 minutes of the start of exercise. . It is not permissible to conduct pre-exercise assessments in a separate session, such as a baseline familiarization or control session. Similarly, post-exercise pain assessments must be carried out within 60 minutes of the exercise's conclusion.

Quality assessment / Risk of bias analysis The risk of potential bias was assessed using Cochrane Collaboration's tool; studies were then classified as low risk, high risk, or unclear. This study was

not funded or sponsored by any special-interest groups.

Strategy of data synthesis Several studies in our review only presented outcomes for a single treatment group without any comparison. As per the standard network meta-analysis methodology, data analysis necessitates the presence of a comparator dataset. To overcome this limitation, we performed an alternative analysis on the baseline model, integrating data from the single-arm study.

Subgroup analysis No subgroup analysis.

Sensitivity analysis We conducted sensitivity analyses by reducing the correlation to 0.5 to test the robustness of the results.

Country(ies) involved Taiwan.

Keywords aerobic exercise, anaerobic exercise, exercise-induced hypoalgesia, isometric exercise, resistance exercise.

Contributions of each author

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