International Platform of Registered Systematic Review and Meta-analysis Protocols

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Systematic Review and Meta-Analysis of Laser Physical Agent for Pain and Disability in Rotator Cuff Tendinopathy: Subgroup Analysis and Meta-Regression Exploration

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Data extraction.

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 24 April 2025 and was last updated on 5 August 2025.

INTRODUCTION

Review question / Objective To investigate the treatment effect of non-invasive low level laser and high intensity laser on pain intensity and disability in the people with rotator cuff tendinopathy.

Rationale Rotator cuff tendinopathy (RC) is a common cause of shoulder pain, with an incidence of 0.3–5.5% and annual prevalence of 0.5–7.4%. It encompasses various sub-acromial conditions and is typically managed with pharmacological treatments and physical therapy, including laser therapy. The laser modalities, low-level (LLLT) and high-intensity (HILT), differ in penetration depth and therapeutic mechanisms. Factors such as laser type, wavelength, mode (pulsed/continuous), and whether used alone or in combination may affect the outcomes. While previous reviews have separately analyzed LLLT and HILT, none has comprehensively evaluated these variable factors together. This study aims to address this gap through a systematic review, meta-analysis, and then meta-regression analysis.

Condition being studied We would like to perform The PICO (population, intervention, comparison, outcome) setting of the current meta-analysis included: (1) P: human participants; (2) I: low-level laser and high-intensity laser; (3) C: other treatment; and (4) O: changes in pain scores and disability.

METHODS

Search strategy Two authors made independent electronic searches in the PubMed, Cochrane library, PEDro, and ClinicalTrials.gov with keyword of ("low-level laser" OR " low intensity laser" OR " low energy laser " OR "high-level laser" OR " high intensity laser" OR " high energy laser ") AND ("rotator cuff tendinopathy " OR " rotator cuff tendinitis" OR "rotator cuff tendinosis" OR

"shoulder impingement syndrome") through the earliest record to January 2025.

Participant or population The people with rotator cuff tendinopathy.

Intervention Non-invasive laser modality.

Comparator Other treatment.

Study designs to be included Randomized controlled trials.

Eligibility criteria (1) RCTs investigating pain intensity and disability before / after non-invasive laser therapy; (2) enrolling adult diagnosed with rotator cuff tendinopathy based on the clinical presentation and the physical examination (e.g., painful arc syndrome, impingement test and Hawkins–Kennedy test); (3) the intervention groups were treated with LLLT alone or HILT plus other treatments; (4) at least one reference group using treatments other than laser therapy.

Information sources Two authors made independent electronic searches in the PubMed, Cochrane library, PEDro, and ClinicalTrials.gov with keyword of ("low-level laser" OR " low intensity laser" OR " low energy laser " OR "high-level laser" OR " high intensity laser" OR " high energy laser ") AND ("rotator cuff tendinopathy " OR " rotator cuff tendinitis" OR "rotator cuff tendinosis" OR "shoulder impingement syndrome") through the earliest record to January 2025.

Main outcome(s) The primary outcomes were the changes in the pain scores following laser therapy or control regimens. The validity and appropriateness of the pain scale used in each trial were also examined by checking the pertinent references.

Additional outcome(s) The secondary outcomes were the changes in the disability following laser therapy or control regimens. The validity and appropriateness of the disability scale used in each trial were also examined by checking the pertinent references.

Data management Two independent authors extracted data from the recruited studies, encompassing demographic data, study design, details of laser therapy and control regimens, and values of the outcomes. The evaluators paid special attention to the effect direction of the scale used in each trial to avoid mis-interpretation.

Quality assessment / Risk of bias analysis The quality of eligible RCTs was assessed using the PEDro score, which evaluates 11 criteria, including randomization, blinding, and outcome measurement. The score of the first criterion is excluded and therefore the total score ranges from 0 to 10. Studies scoring ≥6 are considered high quality, 4–5 medium quality, and ≤3 low quality.

Strategy of data synthesis Because of heterogeneity at the treatment protocols of the enrolled studies, the effect sizes were pooled by using a random-effects model on Comprehensive Meta-Analysis software (version 3, Biostat, Englewood, NJ, United States). A two-tailed p value of less than 0.05 was considered statistically significant. We used Hedges' g to quantify the study outcomes and a value of 0.2, 0.5, and 0.8 were considered small, moderate, and large effect sizes, respectively . 〚 I〛 ^2 and Cochran's Q statistics were also employed to evaluate the degree of heterogeneity across studies. A 〚 I〛 ^2value of 25, 50, and 75% were deemed low, moderate, and high grades of heterogeneity, respectively.

Subgroup analysis Subgroup analyses based on the laser type, regimen, laser mode, and reference to the control group was performed. Meta-regressions of the treatment effects on total treatment duration, session per week and laser wavelength were conducted to see if the pain and disability relieving effect of laser therapy correlated with the aforementioned parameter.

Sensitivity analysis To confirm the robustness of the meta-analysis, the sensitivity analyses were performed using one-study removal method to see if there was a significant change in the summary effect size after removing a particular trial from the analysis.

Language restriction No language limit.

Country(ies) involved Taiwan.

Other relevant information None

Keywords Laser, Rotator cuff tendinopathy, Meta-analysis.

Dissemination plans None.

Contributions of each author

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