



REVIEW

Effects of low-level laser therapy on pain in patients with musculoskeletal disorders: a systematic review and meta-analysis

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ABSTRACT

INTRODUCTION: This meta-analysis investigated the effectiveness of low-level laser therapy (LLLT) on pain in adult patients with musculoskeletal disorders.

EVIDENCE ACQUISITION: A systematic literature search was conducted in the Medline and PEDro databases. Two researchers independently screened titles and abstracts of the retrieved studies for eligibility. Quality assessment of the eligible studies was conducted using the PEDro rating scale. Studies that scored ≥ 4 were included. A random-effects model was used for this meta-analysis. Subgroup meta-analyses were conducted to evaluate the influence of the adherence of the applied LLLT to the World Association of Laser Therapy (WALT) guidelines, the anatomical site under investigation and the study design on the overall weighted mean effect size. Meta regression was used to assess the possible influence of the study quality on the individual study effect sizes.

EVIDENCE SYNTHESIS: Eighteen studies allowing for 21 head-to-head comparisons (totaling N=1462 participants) were included. The pooled raw mean difference (*D*) in pain between LLLT and the control groups was -0.85 (95% CI: -1.22 to -0.48). There was high ($I^2=85.6\%$) and significant between study heterogeneity (Cochran's $Q=139.2$; $df=20$; $P<0.001$). The subgroup meta-analysis of the comparisons not following the WALT guidelines revealed a $\bar{D}=-0.68$ (95% CI: -1.09 to -0.27). In this group, heterogeneity decreased to $I^2=72.6\%$ ($Q=51.2$; $df=14$; $P<0.001$). In the WALT subgroup *D* equaled -1.52 (95% CI: -2.34 to -0.70). This between groups difference was clinically relevant although statistically not significant ($Q=3.24$; $df=1$; $P=0.072$).

CONCLUSIONS: This meta-analysis presents evidence that LLLT is an effective treatment modality to reduce pain in adult patients with musculoskeletal disorders. Adherence to WALT dosage recommendations seems to enhance treatment effectiveness.

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Key words: Low-level light therapy - Meta-analysis - Musculoskeletal diseases - Systematic review.

Introduction

In musculoskeletal rehabilitation, low-level laser therapy (LLLT) is frequently used as an adjunct in the management of pain in patients with musculoskeletal disorders.^{1,2}

LLLT refers to a non-invasive, phototherapy or pho-

tobiomodulation that uses photons at a non-thermal irradiance to stimulate biological activity and has been classified as a safe, non-invasive treatment modality.³

Indeed, several possible mechanisms have been attributed to LLLT such as: increased endogenous opioid neurotransmitter production,⁴ raised threshold to thermal pain and enhanced local blood circulation,^{5,6} in-