

Laser Therapy for Neck Pain

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How to cite this article:

CK Senthil Kumar, Senthil P Kumar. Laser Therapy for Neck Pain. Physiotherapy and Occupational Therapy Journal. 2019;12(3): 157-159.

Abstract

Neck pain is the second common musculoskeletal complaint for a visit to a physical therapist, with huge impact on physical performance, work-related function and quality of life especially in the productive age group. Globally the healthcare burden, impact and costs for mechanical neck pain is due to specific and non-specific etiologies and high incidence of recurrence and surgery due to inadequate diagnosis and inappropriate therapeutic strategies.¹

Keywords: Laser Therapy; Musculoskeletal; Neck pain.

Introduction

Neck pain is the second common musculoskeletal complaint for a visit to a physical therapist, with huge impact on physical performance, work-related function and quality of life especially in the productive age group. Globally the healthcare burden, impact and costs for mechanical neck pain is due to specific and non-specific etiologies and high incidence of recurrence and surgery due to inadequate diagnosis and inappropriate therapeutic strategies.¹

Objective of the Review

The objective of this systematic review was to

highlight the existing evidence for laser therapy in neck pain, through a preliminary search of PubMed (MEDLINE) database of the National Library of Medicine-National Center for BioInformatics.

Search Methods and Strategy

Two independent reviewers utilized a standardized search strategy using “cervical radiculopathy” in article title which yielded 35 articles, and when activating the filters-Abstract and English language, it was a final list of 10 included studies decided upon mutual consensus.

Main Findings

Swedish Council on Health Technology Assessment (SBU)² Report No. 2014-03 stated that laser therapy provided pain relief in chronic neck pain patients upto 2-6 months follow-up, many studies focused on side effects or therapeutic effects compared to placebo, very few reported on cost-effectiveness compared to other treatments especially in acute pain and its impact on function and working capacity.

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Received on: 02.09.2019, **Accepted on** 18.09.2019

Alayat *et al.*³ utilized Multiwave locked system (MLS) laser therapy of an 808 nm continuous laser and a 905 nm pulsed laser compared versus single-wavelength low-level laser therapy (LLLT) using 830 nm laser in 75 chronic neck pain patients who were randomized into three groups- Group I received MLS laser therapy and exercises, Group II received LLLT and exercises, and Group III received placebo laser therapy plus exercises (PL + EX). Both the visual analogue scale (VAS) and neck disability index (NDI) scores reduced significantly in both groups, and MLS plus exercise was more effective therapy for CNP compared to exercise plus LLLT or exercise alone.

Alayat *et al.*⁴ compared the effect of high-intensity laser therapy (HILT) in treatment of 60 male patients with chronic neck pain (CNP) on cervical range of motion (ROM), pain (visual analog scale VAS), and functional activity (neck disability index NDI). The patients were given HILT plus exercise (HILT + EX) and placebo laser plus exercise (PL + EX), respectively. HILT + EX effectively increased cervical ROM and decreased VAS and NDI scores after 6 weeks of treatment compared to PL + EX.

Chow *et al.*⁵ in their systematic review of 16 randomised controlled trials totalling 820 patients and reported the efficacy of LLLT in neck pain. Two trials on acute neck pain reported a relative risk (RR) of 1.69 for pain improvement with LLLT versus placebo. Five trials of chronic neck pain reported a relative risk of 4.05 for LLLT. Overall reduction in VAS scores were 19.86 mm and the adverse events were mild and was reported similar in placebo laser. LLLT was effective for immediate pain relief in acute neck pain and upto 22 weeks in patients with chronic pain.

Chow *et al.*⁶ treated 90 subjects with chronic neck pain and reported the efficacy of 300 mW, 830 nm laser (active versus sham treatment) for a course of 14 treatments over 7 weeks- 3 months. Improvements were noted in Visual Analogue Scale (VAS) scores for pain (2.7 in the treated group and worsened by 0.3 in the control group). All other measures- Short-Form 36 Quality-of-Life questionnaire (SF-36), Northwick Park Neck Pain Questionnaire (NPNQ), Neck Pain and Disability Scale (NPAD), the McGill Pain Questionnaire (MPQ) and Self-Assessed Improvement (SAI) in pain, also effectively improved in the active group compared to placebo. Low-level laser therapy (LLLT), at the parameters used in this study, was efficacious in providing pain relief for patients with chronic neck pain over a period of 3 months.

Chow and Barnsley⁷ published their systematic review of LLLT in neck pain included 5/20 identified RCTs (71 patients in one study, pooled sample size was 202 from four studies) and reiterated the significant positive effects for infrared wavelengths ($\lambda = 780, 810-830, 904, 1,064$ nm) in four trials, with substantial effect size identifiable in two studies.

Gross *et al.*⁸ reported their systematic review of seven eligible RCTs (out of 17 total identified studies). Two trials provided moderate quality evidence (pooled sample size 109 participants) for improvements in pain/disability/quality of life (QoL) and global perceived effect (GPE) up to immediate term. LLLT was able to produce improvements in short-term pain/function/QoL over placebo with low quality evidence for acute neck pain. Successful pain outcome was identified in meta-regression for super-pulsed LLLT in chronic neck pain.

Kadhim-Saleh *et al.*⁹ estimated the efficacy of LLLT in reducing pain scores on visual analog scale (VAS) through their systematic review of nine electronic databases. The authors included eight RCTs (pooled sample size was 443 patients) of which five trials included patients with cervical myofascial pain syndrome (CMPS), and three trials on mixed patient populations. The meta-analysis of 5 above trials yielded a mean improvement of VAS score of 10.54mm with LLLT which was statistically significant, but was well below the clinically meaningful improvement for VAS.

Konstantinovic *et al.*¹⁰ clinically evaluated the LLLT effects in 60 patients with CR who received a course of 15 treatments over 3 weeks with active or a placebo laser. LLLT was applied to the skin projection at the anatomical site of the spinal segment involved with the following parameters: wavelength 905 nm, frequency 5,000 Hz, power density of 12 mW/cm², and dose of 2 J/cm², treatment time 120 seconds, at whole doses 12 J/cm². The treatment group demonstrated better improvements in arm pain and in neck extension compared to sham group.

Discussion and Conclusion

There were few clinical trials on effectiveness of high power laser for patients with neck pain. Few other authors¹¹ utilized sham laser in the comparative treatment group in research on patients with neck pain. There is a dearth need for more high quality RCTs as reported by authors of these

included trials. The few studies on low power laser also could not evidently demonstrate long-term efficacy. Use of standardized outcome measures¹² for neck pain is also another important implication for further research. Future studies could address these issues for establishing better evidence for neurological and neurosurgical rehabilitation of these patients.

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