The effect of 300 mW, 830 nm laser on chronic neck pain

Synopsis


Question: Does 300 mW, 830 nm low-level laser therapy (LLLT) improve pain, disability and quality of life in people with chronic neck pain? Design: Randomised controlled trial. Setting: Primary care (medical centre of 17 general practitioners). Participants: Ninety subjects with chronic neck pain (mean duration 15.1 ± 12.6 years). Interventions: The intervention group received twice-weekly treatments of LLLT (830 nm, 300 mW, at a power density of 0.67 W/cm²) applied to tender points in the neck, for 7 weeks. The control group received sham laser treatment. Outcomes: The primary outcome was pain intensity (10 cm VAS scale). Other outcomes were quality of life (Short Form-36, consisting of a Physical Component Summary and a Mental Component Summary, each scored from 0 to 100); perceived disability (Northwick Park Neck Pain Questionnaire, NPNPQ, measured on a scale of 0 to 36); neck pain intensity and interference with living (Neck Pain and Disability Scale, NPAD, measured on a scale of 0 to 100); pain (Short-Form McGill Pain Questionnaire, MPQ) and a participant rating of global assessment (self-assessed improvement, SAI, expressed as percentage change). Outcomes were measured 1 month after completion of the treatment (approximately 12 weeks from baseline). Results: The between-group difference in VAS pain score at 12 weeks was −3.0 cm (95% CI –2.1 to –3.8). Measured on the McGill VAS Pain Scale, the reduction in pain intensity was −2.2 cm (95% CI –0.9 to –3.5). Self-assessed improvement (SAI) scores favoured the active LLLT group, with between group differences of 41% (95% CI 27.7 to 55.8). The NPAD disability score was reduced by a mean of −12.1 (95% CI –19.3 to –4.8). The mean change in NPNPQ score was −3.0 (95% CI –5.0 to –9.0). Negligible changes (3% to 5%) were reported in the SF-36 and MPQ (sensory and affective) scores. Conclusion: LLLT, as implemented in this study, was effective in providing pain relief for patients with chronic neck pain.

Commentary 1

As stated by the authors of this paper, neck pain is a highly prevalent condition that incurs significant economic and personal costs. Evidence for the efficacy of physical treatment interventions is not strong and studies investigating such interventions are needed urgently.

This randomised, placebo-controlled trial investigated the effect of low level laser therapy (LLLT) on pain, disability, and quality of life in patients with chronic neck pain. The results demonstrated 300 mW, 800 nm LLLT to be effective in reducing pain measured on a VAS scale. There was also improvement on secondary outcomes of disability and superior self-perceived global improvement compared to placebo. The results of this study would appear to be clinically relevant with changes on both the pain and disability measures exceeding documented minimal clinically-important differences (Hagg et al 2003, Leak et al 1994). However it should be noted that the follow-up was three months post baseline assessment and longer term effects are unknown.

The LLLT was delivered to palpably allodynic areas of the cervical and thoracic regions twice-weekly for seven days. With calls for more multimodal approaches to management, it may be difficult for most physiotherapists to reconcile such a monomodal treatment approach. It would, therefore, be interesting to determine the possible additive effect of LLLT to other interventions, for example exercise therapy.

Based on previous animal studies, the authors propose some interesting hypotheses for potential mechanisms underlying their findings, including the reduction of peripheral nociceptive input to the dorsal horn and subsequent pain modulation in the CNS. The authors acknowledge that investigation of subgroups of neck pain rather than ‘lumping’ together people with a variety of underlying mechanisms may be a future approach. This would seem especially prudent for neck pain where subgroups have been identified based on presentations indicative of varying pain processing mechanisms. This includes a group of neck pain patients, with apparent augmented central pain processing changes, that shows recalcitrance to physiotherapy interventions (Scott et al 2005). The effect of LLLT in this patient group would be an interesting investigation.

Overall this study indicates that LLLT is useful in decreasing pain and disability of chronic neck pain, in the medium term. Further studies are warranted to explore more long term effects, additive effects with other interventions, and differential effects in identified neck pain sub-groups.

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References

Commentary 2

A between-group difference of 3 points on a 10 point pain scale is an enormous effect and rarely seen in trials evaluating physical treatment for spinal pain. Clinicians reading this result may be tempted to apply laser to their patients. One difficulty is that other laser trials have produced the opposite result with laser no better than a sham. Advocates of laser explain these contradictions as arising from the use of different doses of laser but they may equally have arisen from differences in trial design.

A key design feature is blinding. Trials with inadequate blinding tend to show a greater effect of intervention (Schulz et al 1995). In the Chow trial the method of blinding was not robust. The two laser units were labelled A and B with only one emitting a laser beam. The authors reported that they achieved blinding by requiring therapist and patients to don protective goggles during treatment. While this method of blinding is better than simply asking people to close their eyes or look away, the potential for unblinding is obvious. Importantly the trial did not assess patient blinding beyond the first treatment and never assessed therapist blinding, so the extent of this potential problem is unclear.

Until this result is replicated in larger trials with more robust blinding I would advise caution with regard to the use of laser in the treatment of chronic neck pain. There are other treatment options for this condition that have more convincing support from clinical trials.

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Reference