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Editorial

The efficacy of low level laser therapy for chronic neck pain

Neck pain is common in the general population. It is in the top three of self-reported musculoskeletal pain, next to low back and shoulder pain. About one-third of adults experience neck pain in the course of 1 year, and about 5–10% of adults have a significantly disabling neck problem (Bovim et al., 1994; Cote et al., 1998). Chronic neck pain is costly in terms of treatment, individual suffering, and time lost from work.

Many treatments are available for chronic neck pain, including drugs, electrotherapy, patient education, spinal manipulation, exercises, and behavioral therapy. However, there is typically little evidence to justify their use. It is important to assess the efficacy of widely used chronic neck pain treatments to have a sound basis for management decisions. Local anesthetics, specific exercises, and spinal mobilization or manipulation when used with exercise seem to be beneficial for chronic neck pain (Gross et al., 2004; Kay et al., 2005). But there is no or conflicting evidence for the efficacy of patient education, multidisciplinary biopsychosocial rehabilitation, and electrotherapy (Gross et al., 2000; Karjalainen et al., 2003; Kroeling et al., 2005).

In this issue of PAIN a study of the efficacy of low level laser therapy (LLLT) is reported (Chow et al., 2006). It concerns a light source that generates extremely pure infrared light, of a single wavelength. When applied to the skin, an infrared laser produces no sensation and does not burn the skin. Because of the low absorption, it is hypothesized that the energy can penetrate deeply into the tissues where it is assumed to have a biostimulative effect. The discussion on its putative working mechanism is ongoing. It is also not very clear how common LLLT for chronic neck pain really is, although LLLT has been used for over 30 years in Eastern Europe and Asia for a wide range of clinical conditions. Chow et al. (2006) report a randomized, double blind, placebo-controlled study of LLLT with a 300 mW, 830 nm laser in 90 subjects with chronic neck pain. Participants received a course of 14 treatments over 7 weeks with either active or sham laser to tender points in the neck. The laser treatment group demonstrated a statistically significant and clinically relevant larger change in pain since baseline 1 month after the end of treatment.

The RCT is a valuable contribution to our knowledge of the efficacy of LLLT in chronic neck pain. However, there are some concerns regarding the interpretation of its findings. Although patients were randomly assigned to the laser group and placebo group, there was a substantial imbalance of baseline pain scores between the groups (i.e. a difference of 1.9 on a 10-points scale). The higher pain scores at baseline in the active laser group may explain, at least partly, the difference in change since baseline between the groups. The authors indeed show that baseline pain severity is a strong predictor of improvement. The likely explanation for this is either regression to the mean or more room for improvement. So there is a clear need to adjust for this baseline imbalance. It is difficult to understand why this is not a dominant feature of the paper. The authors did perform an ordinal regression analysis, suggesting that some effect on pain remains after adjustment. But this odds ratio is difficult to interpret and none of the conventional parametric analyses concerning pain or the other outcomes involve adjustment for the baseline imbalance. With hindsight, pre-stratification for pain severity should be strongly recommended.

The same authors report in a recent systematic review limited evidence for a short-term benefit for chronic neck pain (Chow and Barnsley, 2005). In this review, significant positive effects were reported in four of five of the RCTs included, in which infrared wavelengths (780, 820–830, 904 nm) were used. The authors conclude that larger studies on the effect of LLLT, particularly with long-term follow-up, are needed. Unfortunately, the authors did not completely follow their own advice. Their follow-up extends to only 1 month after treatment, so the long-term effect is not studied. Gur et al. (2004) report the effect of LLLT in patients with chronic

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myofascial pain in the neck and found a significant reduction in pain in the active laser group compared with placebo group at the end of the treatment and 1 week after the treatment, but not 10 weeks after the treatment. So maybe the effect of LLLT does not last. For chronic complaints it is long-term efficacy that counts. Moreover, the course of neck pain shows an episodic nature with recurrent exacerbations and periodic flare-ups of pain. Therefore, RCTs should have a follow-up which is sufficiently long to demonstrate sustainability of the treatment effects (Luime et al., 2005).

Another limitation of the RCT of Chow et al. (2006) concerns its external validity. Recruitment concerned advertisements in a local newspaper and posters in waiting rooms. This makes the source population somewhat vague, although the lack of a placebo response in the sham group and the average complaint duration of 15 years suggest that the participants were chronic cases.

The authors note that under-dosing seems to be common and that future RCTs should have sufficient output power and use a laser with an output power at least 3–5 times that of previous RCTs. They found no alarming differences in adverse effects between groups. But of course their study is much too small to detect serious adverse effects, which are typically rare.

A systematic evaluation of the evidence for the efficacy of LLLT on pain reduction is hampered by the multitude of variables involved in these treatments, such as kind of laser device, wavelength, power, energy density, treatment frequency and duration, and method of application. There is a need for standard guidelines for the application of LLLT in chronic neck pain patients particularly regarding duration, frequency, and optimal and minimal dosages. Further randomized controlled trials should address these treatment variables and use large sample sizes and long-term follow-up.

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