Laser Therapy For Back Pain

Eur J Phys Rehabil Med. 2011 Sep;47(3):367-73. Epub 2011 Jun 8.

Short-term effects of high-intensity laser therapy versus ultrasound therapy in the treatment of low back pain: a randomized controlled trial.

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Abstract

BACKGROUND:
Low back pain (LBP) is a common musculoskeletal disorder that is highly prevalent in the general population. Management of this pathology includes numerous interventions depending on pain severity: analgesic, nonsteroidal anti-inflammatory drugs, steroid injections. However, the effect size and duration of symptom relief are limited. Physical therapy (ultrasound [US], laser therapy, manual therapy, interferential current therapy, Back School, aerobic work, therapeutic aquatic exercise acupuncture) have been reported often with mixed results.

AIM:
To evaluate the short-term effectiveness of high-intensity laser therapy (HILT) versus ultrasound (US) therapy in the treatment of LBP.

DESIGN:
Randomized clinical trial.

SETTING:
University hospital.

POPULATION:
Thirty patients with LBP were randomly assigned to a HILT group or a US therapy group.

METHODS:
Study participants received fifteen treatment sessions of HILT or US therapy over a period of three consecutive weeks (five days/week).

RESULTS:
For the 30 study participants there were no between-group differences at baseline in Visual Analogic Scale (VAS) and Oswestry Low Back Pain Disability Questionnaire (OLBPDQ) scores. At the end of the 3-week intervention, participants in the HILT group showed a significantly greater decrease in pain (measured by the VAS) and an improvement of related disability (measured by the OLBPDQ) compared with the group treated with US therapy.

CONCLUSION:
Our findings obtained after 15 treatment sessions with the experimental protocol suggested greater effectiveness of HILT than of US therapy in the treatment of LBP, proposing HILT as a promising new therapeutic option into the rehabilitation of LBP.

Lasers Med Sci. 2015 Jan;30(1):325-32. doi: 10.1007/s10103-014-1671-8. Epub 2014 Oct 2.

Effect of high-intensity laser therapy in the management of myofascial pain syndrome of the trapezius: a double-blind, placebo-controlled study.

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Abstract

Myofascial pain syndrome (MPS) of the trapezius muscle is one of the main causes of neck pain. In this randomized, double-blind study, we evaluated the effects of high-intensity laser therapy (HILT) in female patients with chronic MPS of the trapezius muscle. The patients were assigned to two groups. The HILT group was treated with HILT and exercise, and the sham therapy group was treated with placebo HILT and exercise. The patients were assessed for pain, cervical active range of motion, disability, and quality of life. Evaluations were performed before treatment (week 0) and after treatment (weeks 4 and 12). Both groups showed significant improvement in all parameters at weeks 4 and 12. However, in a comparison of the percentage changes in the parameters at weeks 4 and 12 relative to pretreatment values, the HILT group showed greater improvement in pain scores, the neck disability index, and several subparts of the short-form 36 health survey (SF-36) (physical functioning, role limitations due to physical functioning, bodily pain, general health perceptions, social functioning, and role limitations due to emotional problems) than did the sham therapy group. We conclude that HILT is an effective therapeutic method in the treatment of patients with chronic MPS of the trapezius muscle.

Lasers Med Sci. 2014 May;29(3):1065-73. doi: 10.1007/s10103-013-1472-5. Epub 2013 Nov 2.

Long-term effect of high-intensity laser therapy in the treatment of patients with chronic low back pain: a randomized blinded placebo-controlled trial.

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Abstract

The aim of this study was to compare the effect of high-intensity laser therapy (HILT), alone or combined with exercise, in the treatment of chronic low back pain (CLBP). A total of 72 male patients participated in this study, with a mean (SD) age of 32.81 (4.48) years. Patients were randomly assigned into three groups and treated with HILT plus exercise (HILT + EX), placebo laser plus exercise (PL + EX), and HILT alone in groups 1, 2, and 3, respectively. The outcomes measured were lumbar range of motion (ROM), pain level by visual analog scale (VAS), and functional disability by both the Roland Disability Questionnaire (RDQ) and the Modified Oswestry Disability Questionnaire (MODQ). Statistical analyses were performed to compare the differences between baseline and post-treatment measurements. The level of statistical significance was set as $P < 0.05$. ROM significantly increased after 4 weeks of treatment in all groups, then significantly decreased after 12 weeks of follow-up, but was still significantly more than the baseline value in groups 1 and 2. VAS, RDQ, and MODQ results showed significant decrease post-treatment in all groups, although the RDQ and MODQ results were not significantly different between groups 2 and 3. HILT combined with exercise appears to be more effective in patients with CLBP than either HLLT alone or placebo laser with exercise.

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High level laser therapy for the treatment of lower back pain: clinical efficacy and comparison of different wavelengths.

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Abstract

High energy laser therapy (HELT) could be a new alternative treatment for lower back pain (LBP), which is a significant public health problem. Nevertheless, differences between the various light waves of HELT have not yet been fully researched. Sixty-six patients with lower back pain were treated using a high energy laser therapy. They were randomized into three different protocols which differed according to wave length (650 nm, 810 nm and TRIAX, which is simultaneous emission of 810 nm, 980 nm e 1064 nm). The other parameters remained constant (5 W and 50 J/cm2 for ten daily sessions). The visual analogue scale (VAS), the Roland Scale, and the Oswestry Score were measured before treatment (T0), and at end of the treatment session (T1) and 1 month (T1), 2 months (T2) and 4 months of follow-up (T4). In each group we verified a statistically significant improvement over time and that there was a relationship between the time and treatment (p less than 0.01). At T1 for all wavelengths we found a statistically significant improvement of three scores (p less than 0.01), which was maintained up to T4. The group treated with 810 nm HELT, showed a better remission of pain on the VAS scale, and disability on the Oswestry Scale at T4 (p=0.01). Comparing T0-T1 the variation in the Roland Score was significant in the patients treated with 810 nm (p less than 0.01). All the wavelengths analyzed proved to be efficacious for LBP. The greater efficacy of 810 nm in promoting nerve regeneration and in modulating the nociception transmission could explain the better outcomes.

Acupunct Med. 2016 Oct;34(5):328-341. doi: 10.1136/acupmed-2015-011036. Epub 2016 May 20.

Low-level laser therapy for chronic non-specific low back pain: a meta-analysis of randomised controlled trials.

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Abstract

OBJECTIVE:
We aimed to conduct an updated review to determine if low-level laser treatment (LLLT), including laser acupuncture, has specific benefits in chronic non-specific low back pain (CNLBP).

METHODS:
Electronic databases were searched for randomised trials using sham controls and blinded assessment examining the intervention of LLLT in adults with CNLBP. Primary outcomes were pain and global assessment of improvement with up to short-term follow-up. Secondary outcomes were disability, range of back movement, and adverse effects. A random effects meta-analysis was conducted. Subgroup analyses were based on laser dose, duration of baseline pain, and whether or not laser therapy used an acupuncture approach.

RESULTS:
15 studies were selected involving 1039 participants. At immediate and short-term follow-up there was significant pain reduction of up to WMD (weighted mean difference) -1.40 cm (95% CI -1.91 to -0.88 cm) in favour of laser treatment, occurring in trials using at least 3 Joules (J) per point, with baseline pain <30 months and in non-acupuncture LLLT trials. Global assessment showed a risk ratio of 2.16 (95% CI 1.61 to 2.90) in favour of laser treatment in the same groups only at immediate follow-up.

CONCLUSIONS:
We demonstrated moderate quality of evidence (GRADE) to support a clinically important benefit in LLLT for CNLBP in the short term, which was only seen following higher laser dose interventions and in participants with a shorter duration of back pain. Rigorously blinded trials using appropriate laser dosage would provide greater certainty around this conclusion.

J Pain Res. 2015 May 26;8:253-6. doi: 10.2147/JPR.S84458. eCollection 2015.

Can intractable discogenic back pain be managed by low-level laser therapy without recourse to operative intervention?

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Abstract

OBJECTIVE:
The aim of the study reported here was to investigate the possible clinical role of low-level laser therapy (LLLT) in discogenic back pain patients who failed to respond to a conventional physical therapy program to avoid recourse to operative intervention.

METHODS:
The paper reports on the long-term mean 5-year prospective follow-up of a patient cohort of 50 unselected patients visiting our tertiary referral pain center for discogenic back pain who had had a single-level lesion documented by magnetic resonance imaging followed by subsequent discography to confirm the affected disc being the pain generator. All of the patients who entered the study had failed response to a combination of nonsteroidal anti-inflammatory agents and had had not less than 3 months of conventional physical therapy. LLLT, at a wavelength of 810 nm wavelength emitted from a GaAlAs semiconductor laser device with 5.4 J per point and a power density of 20 mW/cm(2), was employed. The treatment regimen consisted of three sessions of treatment per week for 12 consecutive weeks.

RESULTS:
All but one patient had significant improvement in their Oswestry Disability Index score, from a mean of 50% score to a mean of 10% score, at the end of treatment at 12 weeks. In addition, surprisingly, the improvement was found maintained at follow-up assessments 1 year and 5 years later. The one patient among the 50 patients who failed to respond eventually required surgery, while the others did not require surgery.

CONCLUSION:
We conclude that LLLT is a viable option in the conservative treatment of discogenic back pain, with a positive clinical result of more than 90% efficacy, not only in the short-term but also in the long-term, with lasting benefits.

Photochem Photobiol. 2015 Mar-Apr;91(2):403-10. doi: 10.1111/php.12415. Epub 2015 Jan 26.

Low level light therapy modulates inflammatory mediators secreted by human annulus fibrosus cells during intervertebral disc degeneration in vitro.

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Abstract

Intervertebral disc degeneration (IVD) is one of the important causes of low back pain and is associated with inflammation induced by interaction between macrophages and the human annulus fibrosus (AF) cells. Low-level light therapy (LLLT) has been widely known to regulate inflammatory reaction. However, the effect of LLLT on macrophage-mediated inflammation in the AF cells has not been studied till date. The aim of this study is to mimic the inflammatory microenvironment and to investigate the anti-inflammatory effect of LLLT at a range of wavelengths (405, 532 and 650 nm) on the AF treated with macrophage-like THP-1 cells conditioned medium (MCM) containing proinflammatory cytokines and chemokines (interleukin-1beta, tumor necrosis factor-alpha, interleukin-6 and 8). We observed that AF cells exposed to MCM secrete significantly higher concentrations of IL-6, IL-8, IL-1β and TNF-α. LLLT markedly inhibited secretion of IL-6 at 405 nm in a time-dependent manner. Level of IL-8 was significantly decreased at all wavelengths in a time-dependent manner. We showed that MCM can induce the inflammatory microenvironment in AF cells and LLLT selectively suppressed IL-6 and 8 levels. The results indicate that LLLT is a potential method of IVD treatment and provide insights into further investigation of its anti-inflammation effect on IVD.

Clin J Pain. 2013 Oct;29(10):e6-9. doi: 10.1097/AJP.0b013e31828b8ef8.

Postherpetic neuralgia: case study of class 4 laser therapy intervention.

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Abstract

OBJECTIVE:
Postherpetic neuralgia (PHN) is a neuropathic sequelae in 8% to 27% of individuals with prior varicella zoster virus infection and herpes zoster resulting in retrograde demyelination, neurotoxic reactive oxygen species levels, and proinflammatory cytokine activation of microglia. Pain management strategies are well documented, but not always effective. Laser therapy has shown utility in nerve injury-related pain disorders and was considered a potentially efficacious intervention.

DESIGN:
Case report.

METHODS:
Class 4 therapeutic laser treatment was applied with a dual wavelength GaAlAs (810 nm), GaAl (980 nm) laser, 2 to 4 W, 50% duty cycle, 10 Hz pulse active phase, 2.5 cm diameter aperture, scanning technique with skin contact, 10-minute treatment, 600 to 1200 J total, energy density of 3.5 to 7.1 J/cm average per session, and power density from 0.41 to 0.82 W/cm for 8 treatments. Outcome measures included the Neuropathy Pain Scale Questionnaire as the primary outcome measure, with the Numeric Pain Scale and total area of allodynia touch sensitivity as secondary outcome measurements.

RESULTS:
The author reports a case of PHN of 15-year duration resistant to prior interventions. Weekly laser therapy treatment over 8 weeks resulted in reduced 0 to 10 Numeric Pain Scale score from 8 to 0, Neuropathy Pain Scale Questionnaire total score from 39 to 4, and allodynia over a 60 cm surface area of the upper trunk and posterior arm totally resolved, with resolution continued at 14-month follow-up.

DISCUSSION:
Theoretically, laser therapy induced tissue changes in this case occurring at and below the skin surface altering inflammatory and excitatory peripheral mechanisms noted to take place in the PHN patient. Peripheral nociceptor firing must be brought back to normal thresholds to resolve such chronic neuropathic pain and inhibit the possible central sensitization component. Anti-inflammatory cytokines, growth factors, nitric oxide, adenosine triphosphate (ATP), and other mechanisms stimulated by laser therapy as noted in medical literature may be central to the favorable response seen in this patient. Controlled clinical trials of class 4 laser therapy in the PHN patient population with similar doses would be beneficial to determine if this is an effective treatment option in PHN.

J Back Musculoskelet Rehabil. 2014;27(3):315-20. doi: 10.3233/BMR-130450.

Low-level laser therapy versus ultrasound therapy in the treatment of subacromial impingement syndrome: a randomized clinical trial.

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Abstract

OBJECTIVE:
The aim of this study was to compare the effectiveness of low-level laser therapy and ultrasound therapy in the treatment of subacromial impingement syndrome.

MATERIALS AND METHODS:
Thirty one patients with subacromial impingement syndrome were randomly assigned to low-level laser therapy group (n=16) and ultrasound therapy group (n=15). Study participants received 10 treatment sessions of low-level laser therapy or ultrasound therapy over a period of two-consecutive weeks (five days per week). Outcome measures (visual analogue pain scale, Shoulder Pain and Disability Index -SPADI-, patient's satisfactory level and sleep interference score) were assessed before treatment and at the 1st and 3rd months after treatment. All patients were analyzed by the intent-to-treat principle.

RESULTS:
Mean reduction in VAS pain, SPADI disability and sleep interference scores from baseline to after 1 month, and 3 months of treatment was statistically significant in both groups ($P < 0.05$). However, there was no significant difference in the mean change in VAS pain, SPADI disability and sleep interference scores between the two groups ($P > 0.05$). The mean level of patient satisfaction in group 1 at the first and third months after treatment was 72.45 ± 23.45 mm and 71.50 ± 16.54 mm, respectively. The mean level of patient satisfaction in group 2 at the first and third months after treatment was 70.38 ± 21.52 mm and 72.09 ± 13.42 mm, respectively. There was no significant difference in the mean level of patient satisfaction between the two groups ($p > 0.05$).

CONCLUSIONS:
The results suggest that efficacy of both treatments were comparable to each other in regarding reducing pain severity and functional disability in patients with subacromial impingement syndrome. Based on our findings, we conclude that low-level laser therapy may be considered as an effective alternative to ultrasound based therapy in patients with subacromial impingement syndrome especially ultrasound based therapy is contraindicated.

J Altern Complement Med. 2013 May;19(5):445-52. doi: 10.1089/acm.2011.0398. Epub 2012 Nov 23.

Effects of Class IV laser therapy on fibromyalgia impact and function in women with fibromyalgia.

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Abstract

OBJECTIVES:
This study evaluated the effects of Class IV laser therapy on pain, Fibromyalgia (FM) impact, and physical function in women diagnosed with FM.

DESIGN:
The study was a double-blind, randomized control trial.

SETTING:
Testing was completed at the university and Rheumatologist office and treatment was completed at a chiropractic clinic.

PARTICIPANTS:
Thirty-eight (38) women (52±11 years; mean±standard deviation) with FM were randomly assigned to one of two treatment groups, laser heat therapy (LHT; n=20) or sham heat therapy (SHT; n=18).

INTERVENTION:
Both groups received treatment twice a week for 4 weeks. Treatment consisted of application of LHT or SHT over seven tender points located across the neck, shoulders, and back. Treatment was blinded to women and was administered by a chiropractic physician for 7 minutes.

OUTCOME MEASURES:
Participants were evaluated before and after treatment for number and sensitivity of tender points, completed the FM Impact Questionnaire (FIQ) and the pain question of the FIQ, and were measured for function using the continuous scale physical functional performance (CS-PFP) test. Data were evaluated using repeated-measures analysis of variance with significance accepted at $p \leq 0.05$.

RESULTS:
There were significant interactions for pain measured by the FIQ (LHT: 7.1±2.3 to 6.2±2.1 units; SHT: 5.8±1.3 to 6.1±1.4 units) and for upper body flexibility measured by the CS-PFP (LHT: 71±17 to 78±12 units; SHT: 77±12 to 77±11 units) with the LHT improving significantly compared to SHT. There was a time effect for the measure of FM impact measured by the FIQ, indicating that FM impact significantly improved from pre- to post-treatment in LHT (63±20 to 57±18 units), while no change was observed in the SHT (57±11 to 55±12 units).

CONCLUSIONS:
This study provides evidence that LHT may be a beneficial modality for women with FM in order to improve pain and upper body range of motion, ultimately reducing the impact of FM.

Laser Ther. 2012 Sep 30;21(3):193-7. doi: 10.5978/islsm.12-OR-10.

Low level laser therapy for patients with cervical disk hernia.

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Abstract

BACKGROUND AND AIMS:
In previous studies we have reported the benefits of low level laser therapy (LLLT) for chronic shoulder joint pain, elbow, hand and finger pain, and low back pain. The present study is a report on the effects of LLLT for chronic neck pain.

MATERIALS AND METHODS:
Over a 3 year period, 26 rehabilitation department outpatients with chronic neck pain, diagnosed as being caused by cervical disk hernia, underwent treatment applied to the painful area with a 1000 mW semi-conductor laser device delivering at 830 nm in continuous wave, 20.1 J/cm(2)/point, and three shots were given per session (1 treatment) with twice a week for 4 weeks.

RESULTS:
1. A visual analogue scale (VAS) was used to determine the effects of LLLT for chronic pain and after the end of the treatment regimen a significant improvement was observed ($p<0.001$). 2. After treatment, no significant differences in cervical spine range of motion were observed. 3. Discussions with the patients revealed that in order to receive continued benefits from treatment, it was important for them to be taught how to avoid postures that would cause them neck pain in everyday life.

CONCLUSION:
The present study demonstrates that LLLT was an effective form of treatment for neck and back pain caused by cervical disk hernia, reinforced by postural training.