

# Laser Therapy for Epicondylitis

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## **A systematic review with procedural assessments and meta-analysis of low level laser therapy in lateral elbow tendinopathy (tennis elbow).**

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### **Abstract**

#### **BACKGROUND:**

Recent reviews have indicated that low level laser therapy (LLLT) is ineffective in lateral elbow tendinopathy (LET) without assessing validity of treatment procedures and doses or the influence of prior steroid injections.

#### **METHODS:**

Systematic review with meta-analysis, with primary outcome measures of pain relief and/or global improvement and subgroup analyses of methodological quality, wavelengths and treatment procedures.

#### **RESULTS:**

18 randomised placebo-controlled trials (RCTs) were identified with 13 RCTs (730 patients) meeting the criteria for meta-analysis. 12 RCTs satisfied half or more of the methodological criteria. Publication bias was detected by Egger's graphical test, which showed a negative direction of bias. Ten of the trials included patients with poor prognosis caused by failed steroid injections or other treatment failures, or long symptom duration or severe baseline pain. The weighted mean difference (WMD) for pain relief was 10.2 mm [95% CI: 3.0 to 17.5] and the RR for global improvement was 1.36 [1.16 to 1.60]. Trials which targeted acupuncture points reported negative results, as did trials with wavelengths 820, 830 and 1064 nm. In a subgroup of five trials with 904 nm lasers and one trial with 632 nm wavelength where the lateral elbow tendon insertions were directly irradiated, WMD for pain relief was 17.2 mm [95% CI: 8.5 to 25.9] and 14.0 mm [95% CI: 7.4 to 20.6] respectively, while RR for global pain improvement was only reported for 904 nm at 1.53 [95% CI: 1.28 to 1.83]. LLLT doses in this subgroup ranged between 0.5 and 7.2 Joules. Secondary outcome measures of painfree grip strength, pain pressure threshold, sick leave and follow-up data from 3 to 8 weeks after the end of treatment, showed consistently significant results in favour of the same LLLT subgroup ( $p < 0.02$ ). No serious side-effects were reported.

#### **CONCLUSION:**

LLLT administered with optimal doses of 904 nm and possibly 632 nm wavelengths directly to the lateral elbow tendon insertions, seem to offer short-term pain relief and less disability in LET, both alone and in conjunction with an exercise regimen.

## **Long term effects of high intensity laser therapy in lateral epicondylitis patients.**

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### **Abstract**

The objective of this study is to investigate short- and long-term effects of high-intensity laser therapy (HILT) in lateral epicondylitis (LE) patients. Thirty patients with LE diagnosis (23 unilateral and 7 bilateral in total 37 elbows) were treated using HILT. LE patients were evaluated before, right after, and 6 months following HILT intervention post-treatment using visual analogue scale for pain (VAS) during activity and resting. Disabilities of the Arm, Shoulder, and Hand (DASH) Score and hand grip strength test (HGST) were used. The participants of the present study were also evaluated using Short-Form 36 (SF-36) before and 6 months after the treatment. Out of the 30 patients, 8 were male and 22 female with a mean age of  $47.2 \pm 9.7$ . The activity and resting VAS, DASH, and HGST scores revealed statistically significant improvement ( $p = 0.001$ ) following treatment. Whereas VAS activity, DASH, and HGST scores increased after treatment until post-treatment 6 months significantly ( $p = 0.001$ ), VAS resting scores remained stable ( $p = 0.476$ ). A statistically significant improvement was also evident in the physical and mental components of SF-36 scores following treatment until post-treatment 6 months compared to pre-treatment scores ( $p = 0.001$ ). In conclusion, the results of the present study suggest that HILT is a reliable, safe, and effective treatment option in LE patients in the short and long term considering pain, functional status, and quality of life.

## **Effectiveness of high-intensity laser therapy and splinting in lateral epicondylitis; a prospective, randomized, controlled study.**

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### **Abstract**

Lateral epicondylitis (LE) is a common disorder that causes pain on the outside of the elbow, as well as pain and weakness during gripping. In this prospective, randomized, controlled, assessor-blinded trial, we planned to investigate the effects of high-intensity laser therapy (HILT) in patients with LE and to compare these results with those of a brace and placebo HILT. Patients were randomly assigned to three treatment groups. The first group was treated with HILT. The second group (sham therapy group) received placebo HILT, while the third group (brace group) used the lateral counterforce brace for LE. The patients were assessed for grip strength, pain, disability, and quality of life. Outcome measurements and ultrasonographic examination of the patients were performed before treatment (week 0) and after treatment (after 4 and 12 weeks). HILT and brace groups showed significant improvements for most evaluation parameters (pain scores, grip strength, disability scores, and several subparts of the short-form 36 health survey (physical function, role limitations due to physical functioning, bodily pain, general health, and vitality)) after treatment (after 4 and 12 weeks). However, the improvements in evaluation parameters of the patients with LE in HILT and brace groups were not reflected to ultrasonographic findings. Furthermore, comparison of the percentage changes of the parameters after treatment relative to pretreatment values did not show a significant difference between HILT and brace groups. We conclude that HILT and splinting are effective physical therapy modalities for patients with LE in reducing pain and improving disability, quality of life, and grip strength.

## **Low level laser therapy for sports injuries.**

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### **Abstract**

#### **BACKGROUND AND AIMS:**

Our hospital has used LLLT in the treatment of athletes since 1990. We had a good result about LLLT for sports injuries. However, few articles have attempted to evaluate the efficacy of LLLT for sports injuries. The aims of this study was to evaluate the efficacy of LLLT for sports injuries. Materials (Subjects) and Methods: Forty one patients underwent LLLT in our hospital. These patients included 22 men and 19 women with an average age of 38.9 years old. Patients were irradiated by diode laser at points of pain and/or acupuncture points. Patients underwent LLLT a maximum treatment of 10 times (mean 4.1 times). We evaluated the efficacy of LLLT using a Pain relief score (PRS). A score of 2 to 5 after treatment was regarded as very good, 6 to 8 as good, and 9 to 10 as poor. A PRS score of less than 5 was regarded as effective.

#### **RESULTS:**

The rate of effectiveness (PRS of 5 or less) after LLLT was 65.9% (27/41 patients).

#### **DISCUSSION:**

In this study, the resulting rate of effectiveness was 65.9% for all sports injuries. However, we have a high rate of effectiveness for Jumper's knee, tennis elbow and Achilles tendinitis and cases that were irradiated laser by a physician.

#### **CONCLUSIONS:**

LLLT is an effective treatment for sports injuries, particularly jumper's knee, tennis elbow and Achilles tendinitis.

## **Investigation of the effect of GaAs laser therapy on lateral epicondylitis.**

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### **Abstract**

#### **BACKGROUND AND OBJECTIVE:**

There are conflicting reports regarding the efficacy of low energy laser therapy in treatment of lateral epicondylitis (LE). Contradictory results are considered to be due to different joint treatment protocols regarding variables such as dose, duration, and frequency. The aim of this study was to investigate the efficacy of gallium-arsenide (GaAs) laser therapy, which was performed with the dose regimen recommended by the World Association for Laser Therapy, in relieving pain and improving functional activities in patients with LE.

#### **PATIENTS AND METHODS:**

Forty-nine patients (50 elbows) evaluated in our outpatient clinic were included in the study. Elbows were randomized into two groups: laser (n = 25) and placebo laser (n = 25). Either laser or placebo laser therapy was applied to patients for 15 sessions (5 d per week for 3 weeks). Main outcome measures were visual analog scale, tenderness, Disability of the Arm Shoulder and Hand (DASH) questionnaire, the Patient-Related Lateral Epicondylitis Evaluation (PRTEE) test, pain-free grip strength, and the Nottingham Health Profile (NHP) questionnaire. Evaluations were performed before treatment, at the end of 3 weeks of treatment, and after the 12th week of treatment ended.

#### **RESULTS:**

Upon post-treatment evaluation, a significant improvement in all parameters was observed for both groups ( $p < 0.05$ ). No significant difference was found when the laser and placebo groups were compared. At the 12 week evaluation, a significant sustained improvement in all parameters was observed. On intergroup evaluation, a significant improvement was observed in favor of the active treatment group regarding pain with resisted extension of the wrist, tenderness with pressure, and for both the total and subgroup scores of the DASH questionnaire and PRTEE test, as well as for the pain subgroup of the NHP questionnaire ( $p < 0.05$ ).

#### **CONCLUSION:**

Although low energy laser therapy had no advantage compared to placebo in patients with LE for the short term, a significant improvement, particularly in functional parameters, was achieved in the long term. Laser, which has relatively no side effects, might be included among long-term treatment options for LE.

## **Effects of 904-nm low-level laser therapy in the management of lateral epicondylitis: a randomized controlled trial.**

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### **Abstract**

#### **OBJECTIVE:**

The aim of this study was to evaluate the effectiveness of 904-nm low-level laser therapy (LLLT) in the management of lateral epicondylitis.

#### **BACKGROUND DATA:**

Lateral epicondylitis is characterized by pain and tenderness over the lateral elbow, which may also result in reduction in grip strength and impairment in physical function. LLLT has been shown effective in its therapeutic effects in tissue healing and pain control.

#### **METHODS:**

Thirty-nine patients with lateral epicondylitis were randomly assigned to receive either active laser with an energy dose of 0.275 J per tender point (laser group) or sham irradiation (placebo group) for a total of nine sessions. The outcome measures were mechanical pain threshold, maximum grip strength, level of pain at maximum grip strength as measured by the Visual Analogue Scale (VAS) and the subjective rating of physical function with Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire.

#### **RESULTS:**

Significantly greater improvements were shown in all outcome measures with the laser group than with the placebo group ( $p < 0.0125$ ), except in the two subsections of DASH.

#### **CONCLUSION:**

This study revealed that LLLT in addition to exercise is effective in relieving pain, and in improving the grip strength and subjective rating of physical function of patients with lateral epicondylitis.

## **The effectiveness of therapeutic class IV (10 W) laser treatment for epicondylitis.**

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### **Abstract**

#### **BACKGROUND AND OBJECTIVE:**

Photobiomodulation has been shown to modulate cellular protein production and stimulate tendon healing in a dose-dependent manner. Previous studies have used class IIIb lasers with power outputs of less than 0.5 W. Here we evaluate a dual wavelength (980/810 nm) class IV laser with a power output of 10 W for the purpose of determining the efficacy of class IV laser therapy in alleviating the pain and dysfunction associated with chronic epicondylitis.

#### **METHODS:**

Sixteen subjects volunteered for laser therapy, or an identically appearing sham instrument in a randomized, placebo-controlled, double-blinded clinical trial. Subjects underwent clinical examination (pain, function, strength, and ultrasonic imaging) to confirm chronic tendinopathy of the extensor carpi radialis brevis tendon, followed by eight treatments of  $6.6 \pm 1.3$  J/cm<sup>2</sup> (laser), or sham over 18 days. Safety precautions to protect against retinal exposure to the laser were followed. The exam protocol was repeated at 0, 3, 6 and 12 months post-treatment.

#### **RESULTS:**

No initial differences were seen between the two groups. In the laser treated group handgrip strength improved by  $17 \pm 3\%$ ,  $52 \pm 7\%$ , and  $66 \pm 6\%$  at 3, 6, and 12 months respectively; function improved by  $44 \pm 1\%$ ,  $71 \pm 3\%$ , and  $82 \pm 2\%$ , and pain with resistance to extension of the middle finger was reduced by  $50 \pm 6\%$ ,  $93 \pm 4\%$ , and  $100 \pm 1\%$  at 3, 6 and 12 months, respectively. In contrast, no changes were seen until 12 months following sham treatment (12 months: strength improved by  $13 \pm 2\%$ , function improved by  $52 \pm 3\%$ , pain with resistance to extension of the middle finger reduced by  $76 \pm 2\%$ ). No adverse effects were reported at any time.

#### **CONCLUSIONS:**

These findings suggest that laser therapy using the 10 W class IV instrument is efficacious for the long-term relief of the symptoms associated with chronic epicondylitis. The potential for a rapidly administered, safe and effective treatment warrants further investigation.

## **Treatment of medial and lateral epicondylitis--tennis and golfer's elbow--with low level laser therapy: a multicenter double blind, placebo-controlled clinical study on 324 patients.**

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### **Abstract**

#### **BACKGROUND AND OBJECTIVE:**

Among the other treatment modalities of medial and lateral epicondylitis, low level laser therapy (LLLT) has been promoted as a highly successful method. The aim of this clinical study was to assess the efficacy of LLLT using trigger points (TPs) and scanner application techniques under placebo-controlled conditions.

#### **STUDY DESIGN/MATERIAL AND METHODS:**

The current clinical study was completed at two Laser Centers (Locarno, Switzerland and Opatija, Croatia) as a double-blind, placebo controlled, crossover clinical study. The patient population (n = 324), with either medial epicondylitis (Golfer's elbow; n = 50) or lateral epicondylitis (Tennis elbow; n = 274), was recruited. Unilateral cases of either type of epicondylitis (n = 283) were randomly allocated to one of three treatment groups according to the LLLT technique applied: (1) Trigger points; (2) Scanner; (3) Combination Treatment (i.e., TPs and scanner technique). Bilateral cases of either type of epicondylitis (n = 41) were subject to crossover, placebo-controlled conditions. Laser devices used to perform these treatments were infrared (IR) diode laser (GaAlAs) 830 nm continuous wave for treatment of TPs and HeNe 632.8 nm combined with IR diode laser 904 nm, pulsed wave for scanner technique. Energy doses were equally controlled and measured in Joules/cm<sup>2</sup> either during TPs or scanner technique sessions in all groups of patients. The treatment outcome (pain relief and functional ability) was observed and measured according to the following methods: (1) short form of McGill's Pain Questionnaire (SF-MPQ); (2) visual analogue scales (VAS); (3) verbal rating scales (VRS); (4) patient's pain diary; and (5) hand dynamometer.

#### **RESULTS:**

Total relief of the pain with consequently improved functional ability was achieved in 82% of acute and 66% of chronic cases, all of which were treated by combination of TPs and scanner technique.

#### **CONCLUSIONS:**

This clinical study has demonstrated that the best results are obtained using combination treatment (i.e., TPs and scanner technique). Good results are obtained from adequate treatment technique correctly applied, individual energy doses, adequate medical education, clinical experience, and correct approach of laser therapists. We observed that under- and overirradiation dosage can result in the absence of positive therapy effects or even opposite, negative (e.g., inhibitory) effects. The current clinical study provides further evidence of the efficacy of LLLT in the management of lateral and medial epicondylitis.



