

Elbow Pain

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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 (provisional)

Background

Recent reviews have indicated that low level 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 EggerA'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.

Conclusions

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. This finding contradicts the conclusions of previous reviews which failed to assess treatment procedures, wavelengths and optimal doses.

[J Hand Ther.](#) 2008 Jan-Mar;21(1):63-8.

The Short-term Efficacy of Laser, Brace, and Ultrasound Treatment in Lateral Epicondylitis: A Prospective, Randomized, Controlled Trial.

[Oken O](#), [Kahraman Y](#), [Ayhan F](#), [Canpolat S](#), [Yorgancioglu ZR](#), [Oken OF](#).

Ankara Education and Research Hospital, Department of Physical Medicine and Rehabilitation, Division of Hand Rehabilitation, Ankara, Turkey.

The aims of this study were to evaluate the effects of low-level laser therapy (LLLT) and to compare these with the effects of brace or ultrasound (US) treatment in tennis elbow. The study design used was a prospective and randomized, controlled, single-blind trial. Fifty-eight outpatients with lateral epicondylitis (9 men, 49 women) were included in the trial. The patients were divided into three groups: 1) brace group-brace plus exercise, 2) ultrasound group-US plus exercise, and 3) laser group-LLLT plus exercise. Patients in the brace group used a lateral counterforce brace for three weeks, US plus hot pack in the ultrasound group, and laser plus hot pack in the LLLT group. In addition, all patients were given progressive stretching and strengthening exercise programs. Grip strength and pain severity were evaluated with visual analog scale (VAS) at baseline, at the second week of treatment, and at the sixth week of treatment. VAS improved significantly in all groups after the treatment and in the ultrasound and laser groups at the sixth week ($p < 0.05$). Grip strength of the affected hand increased only in the laser group after treatment, but was not changed at the sixth week. There were no significant differences between the groups on VAS and grip strength at baseline and at follow-up assessments. The results show that, in patients with lateral epicondylitis, a brace has a shorter

beneficial effect than US and laser therapy in reducing pain, and that laser therapy is more effective than the brace and US treatment in improving grip strength.

[Photomed Laser Surg.](#) 2007 Apr;25(2):65-71

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

[Lam LK](#), [Cheing GL](#).

Physiotherapy Department, Queen Elizabeth Hospital, Hong Kong.

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.

[Photomed Laser Surg.](#) 2007 Jun;25(3):205-13

Effects of low-level laser and plyometric exercises in the treatment of lateral epicondylitis.

[Stergioulas A](#).

Faculty of Human Movement & Quality of Life, Peloponnese University, Sparta, Greece.

Objective: This study was undertaken to compare the effectiveness of a protocol of combination of laser with plyometric exercises and a protocol of placebo laser with the same program, in the treatment of tennis elbow. **Background Data:** The use of low-level laser has been recommended for the management of tennis elbow with contradictory

results. Also, plyometric exercises was recommended for the treatment of the tendinopathy. Methods: Fifty patients who had tennis elbow participated in the study and were randomised into two groups. Group A (n = 25) was treated with a 904 Ga-As laser CW, frequency 50 Hz, intensity 40 mW and energy density 2.4 J/cm², plus plyometric exercises and group B (n = 25) that received placebo laser plus the same plyometric exercises. During eight weeks of treatment, the patients of the two groups received 12 sessions of laser or placebo, two sessions per week (weeks 1-4) and one session per week (weeks 5-8). Pain at rest, at palpation on the lateral epicondyle, during resisted wrist extension, middle finger test, and strength testing was evaluated using Visual Analogue Scales. Also it was evaluated the grip strength, the range of motion and weight test. Parameters were determined before the treatment, at the end of the eighth week course of treatment (week 8), and eighth (week 8) after the end of treatment. Results: Relative to the group B, the group A had (1) a significant decrease of pain at rest at the end of 8 weeks of the treatment (p < 0.005) and at the end of following up period (p < 0.05), (2) a significant decrease in pain at palpation and pain on isometric testing at 8 weeks of treatment (p < 0.05), and at 8 weeks follow-up (p < 0.001), (3) a significant decrease in pain during middle finger test at the end of 8 weeks of treatment (p < 0.01), and at the end of the follow-up period (p < 0.05), (4) a significant decrease of pain during grip strength testing at 8 weeks of treatment (p < 0.05), and at 8 weeks follow-up (p < 0.001), (5) a significant increase in the wrist range of motion at 8 weeks follow-up (p < 0.01), (6) an increase in grip strength at 8 weeks of treatment (p < 0.05) and at 8 weeks follow-up (p < 0.01), and (7) a significant increase in weight-test at 8 weeks of treatment (p < 0.05) and at 8 weeks follow-up (p < 0.005). Conclusion: The results suggested that the combination of laser with plyometric exercises was more effective treatment than placebo laser with the same plyometric exercises at the end of the treatment as well as at the follow-up. Future studies are needed to establish the relative and absolute effectiveness of the above protocol.

J Clinical Laser Med & Surg. 1998; 16 (3): 145-151.

Laser is effective for medial and lateral epicondylitis

Simunovic Z, Trobonjaca T et al.

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In a two center study 324 patients with unilateral medial or lateral epicondylitis were treated with LLLT. Trigger points were treated with 830 nm. 633 and 904 nm in combination was used in the scanning mode. Total pain relief was obtained in 82% of the acute cases and 66% in the chronic cases. A combination of trigger points (TP) and scanning was more effective than TP alone and TP alone were more effective than scanning alone. One of the centers had slightly less powerful lasers and the outcome was a bit lower, although the dosage was the same in both centers.

TREATMENT OF MEDIAL AND LATERAL EPICONDYLITIS - TENNIS AND GOLFER'S ELBOW-WITH LOW LEVEL LASER THERAPY: A MULTICENTER STUDY

Zlatko Simunovic, M.D., F.M.H., 2Tatjana Trobonjaca, M.D. and 3Zlatko Trobonjaca, M.D. 1Pain Clinic-Laser Center, Locarno, Switzerland 2Laser Center, Opatija, Croatia 3Department of Physiology and Immunology, Faculty of Medicine, University of Rijeka, Croatia

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 scanning application techniques under placebo controlled conditions. 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) TPs; (2) scanning, and (3) Combination treatment (i.e., TPs and scanning 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) 830nm continuous wave for treatment of TPs and HeNe 632.8nm combined with IR diode laser 904nm pulsed wave for scanning technique. Energy doses were equally controlled and measured in Joules/cm² either during TPs or scanning 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 scale (VAS); (3) Verbal Rating Scale (VRS); (4) Patient's pain diary; and (5) hand dynamometer. 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 scanning technique.

This clinical study has demonstrated that the best results are obtained using combination treatment (i.e., TPs and scanning 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 over-irradiation dosage can result in the absence of positive therapy effects or even opposite, negative (i.e. inhibitory) effects. The current clinical study provides further evidence of the efficacy of LLLT in the management of lateral and medial epicondylitis. ENTER DOUBLE BLIND, PLACEBO CONTROLLED CLINICAL STUDY ON 324 PATIENTS

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the Division of Physiotherapy Science, University of Bergen. It has also been published in Physical Therapy Reviews. 1998; 3: 121-132.

Here is the Conclusion of the thesis: “A systematic review has been performed on the effect of LLLT for three diagnoses. LLLT was evaluated on similar criteria for methodological assessments of trials as previously established for medical interventions. No evidence was found to indicate that randomized controlled trials on LLLT for tendinitis/bursitis of the shoulder, lateral epicondylalgia and ankle sprains were methodologically inferior to RCTs on medical interventions. The clinical effects of LLLT were found to be supported by scientific evidence regarding short (0-4 weeks) and medium term (<3 months) efficacy for subacute or chronic lateral epicondylitis, and short term efficacy (>3 months) for subacute or chronic lateral epicondylitis, and short term efficacy (> 3 months) for subacute or chronic shoulder tendinitis/bursitis. The evidence of effect from LLLT for acute ankle sprain is inconclusive, although there seems to be a slight tendency in favour of LLLT. Adverse effects of LLLT are rarely seen and only in minor forms (nausea, headache) compared to medication, where more serious gastrointestinal discomfort or ulcers are not uncommon. It has also been shown that trials in favour of active treatment had more treatments per week than the trials showing no difference in effect. In short one could say that LLLT should be used much in the same way as NSAID are used for short periods of time. Most trials showing significant effects used an IR 904 nm laser, but some results in favour of IR lasers with wavelengths of 780, 820 and 830 nm were also observed. Clinical effects of LLLT were best in subacute conditions. In chronic conditions a higher dosage and more treatments seem to be needed. The results of the high quality LLLT trials were all in favour of treatment with confidence intervals not including zero, and the trials came from several different research groups. Evidence was found to be at the highest or the second highest level depending on what level of clinical significance is decided according to the classification of Oxman (1994) and McQuay (1997). The review found little support for the alleged large placebo effects of LLLT. In chronic cases the placebo effect is probably less than 10%, after the natural history of the complaints is taken into account.”

In the “Summary of discussion on clinical effect estimates for LLLT” the author writes:

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Treatment of Tennis Elbow

Kazuyoshi Zenba, the president of
Isehara Therapeutic Institute
PHOTO: "Treatment of tennis elbow"

From

<http://www.greenmed.co.jp/lpl/E/tennisE.htm>

Although moderate sports are good for health, too much exercise gives damages to bones and muscles. If the excessive stress is repeated to a Certain part of the elbow, bones or muscles, the part becomes inflamed and will be led to the pain. In case of the tennis elbow, the outside part is typically damaged. An early treatment by the low power laser is very effective to eliminate the inflammation and the pain of such tennis elbow.

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[Photomed Laser Surg.](#) 2005 Aug;23(4):425-30.

Effectiveness of low-level laser therapy for lateral elbow tendinopathy.

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OBJECTIVE: Our aim was to determine the effectiveness of low-level laser therapy (LLLT) in the management of lateral elbow tendinopathy (LET) and to provide recommendations based on this evidence. **BACKGROUND DATA:** LET is a common clinical condition, and a wide array of physiotherapy treatments is used for treating LET. **METHODS:** Randomized controlled trials (RCTs) identified by a search strategy in six databases were used in combination with reference checking. RCTs that included LLLT, patients with LET, and at least one of the clinically relevant outcome measure were selected. A qualitative analysis of the selected studies was conducted using the Chalmers' technique. **RESULTS:** Nine RCTs fulfilled the criteria and were included in the review. Although these studies had satisfactory methodology, shortcomings were not absent; poor results were revealed as to the effectiveness of LLLT for LET management. **CONCLUSIONS:** LLLT need not be ruled out for LET as it is a dose-response modality, and the optimal treatment dose has obviously not yet have been discovered. Further

research with well-designed RCTs is needed to establish the absolute and relative effectiveness of this intervention for LET.

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[Australas Chiropr Osteopathy.](#) 1998 Jul;7(2):53-67.

A critical review of the current conservative therapies for tennis elbow (lateral epicondylitis).

[Viola L.](#)

The pathogenesis, pathology, natural course, and in particular the treatment of lateral epicondylitis (tennis elbow) remains controversial. An extensive review of the scientific literature with respect to the conservative treatment of tennis elbow, revealed that acceptable epidemiological techniques of the prospective randomised control trials or case controlled studies are scarce. While administration of steroid compounds has traditionally been the mainstay of conservative treatment of tennis elbow, the high recurrence rate of side effects and structural tissue changes associated with steroid therapy, leaves this modality as the most controversial approach in the treatment of tennis elbow. In contrast, in some studies evidence in favour of a role for classical acupuncture, ultrasound and low level laser as effective therapeutic means in the treatment of tennis elbow has been provided. As these modalities have not been associated with any side effects, in view of the ease of application, low cost and good curative effects, their increased application has been suggested by some authors. This proposition, however, remains rather conjectural until it could be convincingly substantiated by future studies with appropriate epidemiological design.

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