

LLLT / RANDOMIZED / DOUBLE-BLIND STUDY / PLACEBO / PATIENTS / HUMAN / CONCLUSION / INFLAMMATION

[Br J Sports Med.](#) 2006 Jan;40(1):76-80; discussion 76-80.

**A randomised, placebo controlled trial of low level laser therapy for activated Achilles tendinitis with microdialysis measurement of peritendinous prostaglandin E2 concentrations.**

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**Abstract**

**BACKGROUND:**

Low level laser therapy (LLLT) has gained increasing popularity in the management of tendinopathy and arthritis. Results from in vitro and in vivo studies have suggested that inflammatory modulation is one of several possible biological mechanisms of LLLT action.

**OBJECTIVE:**

To investigate in situ if LLLT has an anti-inflammatory effect on activated tendinitis of the human Achilles tendon.

**SUBJECTS:**

Seven patients with bilateral Achilles tendinitis (14 tendons) who had aggravated symptoms produced by pain inducing activity immediately before the study.

**METHOD:**

Infrared (904 nm wavelength) LLLT (5.4 J per point, power density 20 mW/cm<sup>2</sup>) and placebo LLLT (0 J) were administered to both Achilles tendons in random blinded order.

**RESULTS:**

Ultrasonography Doppler measurements at baseline showed minor inflammation through increased intratendinous blood flow in all 14 tendons and measurable resistive index in eight tendons of 0.91 (95% confidence interval 0.87 to 0.95). Prostaglandin E2 concentrations were significantly reduced 75, 90, and 105 minutes after active LLLT compared with concentrations before treatment ( $p = 0.026$ ) and after placebo LLLT ( $p = 0.009$ ). Pressure pain threshold had increased significantly ( $p = 0.012$ ) after active LLLT compared with placebo LLLT: the mean difference in the change between the groups was 0.40 kg/cm<sup>2</sup> (95% confidence interval 0.10 to 0.70).

**CONCLUSION:**

LLLT at a dose of 5.4 J per point can reduce inflammation and pain in activated Achilles tendinitis. LLLT may therefore have potential in the management of diseases with an inflammatory component.

[J Clin Periodontol.](#) 2005 Jul;32(7):714-9.

**The short-term effects of low-level lasers as adjunct therapy in the treatment of periodontal inflammation.**

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## **Abstract**

### **OBJECTIVES:**

The aim of this split-mouth, double-blind controlled clinical trial was to study the effects of irradiation with low-level lasers as an adjunctive treatment of inflamed gingival tissue.

### **MATERIALS AND METHODS:**

Seventeen patients with moderate periodontitis were included. After clinical examination, all teeth were scaled and root planed (SRP). One week after SRP, we took samples of gingival crevicular fluid (GCF) and subgingival plaque. The laser therapy was started 1 week later and continued once a week for 6 weeks. One side of the upper jaw was treated with active laser and the other with a placebo. The test side was treated with two low-level lasers having wavelengths of 635 and 830 nm. The patients then underwent another clinical examination with sampling of GCF and plaque. The GCF samples were analysed for elastase activity, interleukin-1beta (IL-1beta) and metalloproteinase-8 (MMP-8). We examined the subgingival plaque for 12 bacteria using DNA probes.

### **RESULTS:**

The clinical variables i.e. probing pocket depth, plaque and gingival indices were reduced more on the laser side than on the placebo one ( $p < 0.01$ ). The decrease in GCF volume was also greater on the laser side, 0, 12 microl, than on the placebo side, 0.05 microl ( $p = 0.01$ ). The total amount of MMP-8 increased on the placebo side but was slightly lower on the laser side ( $p = 0.052$ ). Elastase activity, IL-1beta concentration and the microbiological analyses showed no significant differences between the laser and placebo sides.

### **CONCLUSION:**

Additional treatment with low-level lasers reduced periodontal gingival inflammation

LLLT / RANDOMIZED / DOUBLE-BLIND STUDY / PLACEBO / PATIENTS / HUMAN / CONCLUSION / HEALING

[Lasers Surg Med.](#) 2009 Aug;41(6):433-41. doi: 10.1002/lsm.20789.

## **Phototherapy promotes healing of chronic diabetic leg ulcers that failed to respond to other therapies.**

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### **Author information**

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## **Abstract**

### **OBJECTIVE:**

We tested the hypothesis that combined 660 and 890 nm LED phototherapy will promote healing of diabetic ulcers that failed to respond to other forms of treatment.

### **RESEARCH DESIGN AND METHODS:**

A double-blind randomized placebo controlled design was used to study 23 diabetic leg ulcers in two groups of 14 patients. Group one ulcers were cleaned, dressed with 1% silver sulfadiazine cream and treated with "placebo" phototherapy ( $< 1.0 \text{ J cm}^{-2}$ ) twice per week, using a Dynatron Solaris 705(R) device. Group two ulcers were treated similarly but received  $3 \text{ J cm}^{-2}$  dose.

## RESULTS:

At each of 15, 30, 45, 60, 75, and 90 days of healing, mean ulcer granulation and healing rates were significantly higher for group two than the "placebo" group ( $P < 0.02$ ). While "placebo" treated ulcers worsened during the initial 30 days, group two ulcers healed rapidly; achieving 56% more granulation and 79.2% faster healing by day 30, and maintaining similarly higher rates of granulation and healing over the "placebo" group all through. By day 90, 58.3% of group two ulcers had healed fully and 75% had achieved 90-100% healing. In contrast, only one "placebo" treated ulcer healed fully by day 90; no other ulcer attained  $>$  or  $=90\%$  healing.

## CONCLUSION:

Combined 660 and 890 nm light promotes rapid granulation and healing of diabetic ulcers that failed to respond to other forms of treatment.

LLLT / RANDOMIZED / DOUBLE-BLIND STUDY / PLACEBO / PATIENTS / HUMAN / CONCLUSION / PAIN

[Clin Interv Aging](#). 2015 Aug 5;10:1255-8. doi: 10.2147/CIA.S86907. eCollection 2015.

## Can combined use of low-level lasers and hyaluronic acid injections prolong the longevity of degenerative knee joints?

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## Abstract

### BACKGROUND:

This study evaluated whether half-yearly hyaluronic acid injection together with low-level laser therapy in addition to standard conventional physical therapy can successfully postpone the need for joint replacement surgery in elderly patients with bilateral symptomatic tricompartmental knee arthritis.

### METHODS:

In this prospective, double-blind, placebo-controlled study, 70 consecutive unselected elderly patients with bilateral tricompartmental knee arthritis were assigned at random to either one of two conservative treatment protocols to either one of the painful knees. Protocol A consisted of conventional physical therapy plus a sham light source plus saline injection, and protocol B consisted of protocol A with addition of half-yearly hyaluronic acid injection as well as low-level laser treatment instead of using saline and a sham light source. Treatment failure was defined as breakthrough pain necessitating joint replacement.

### RESULTS:

Among the 140 painful knees treated with either protocol A or protocol B, only one of the 70 painful knees treated by protocol B required joint replacement, whereas 15 of the 70 painful knees treated by protocol A needed joint replacement surgery ( $P < 0.05$ ).

### CONCLUSION:

We conclude that half-yearly hyaluronic acid injections together with low-level laser therapy should be incorporated into the standard conservative treatment protocol for symptomatic knee arthritis, because it may prolong the longevity of the knee joint without the need for joint replacement.

[Pain Res Manag](#). 2014 Nov-Dec;19(6):e154-8. Epub 2014 Jun 19.

## **Does low-level laser therapy enhance the efficacy of intravenous regional anesthesia?**

[Nesioonpour S](#), [Akhondzadeh R](#), [Mokmeli S](#), [Moosavi S](#), [Mackie M](#), [Naderan M](#).

### **Abstract**

#### **BACKGROUND:**

The use of intravenous regional anesthesia (IVRA) is limited by pain resulting from the application of tourniquets and postoperative pain.

#### **OBJECTIVE:**

To assess the efficacy of low-level laser therapy added to IVRA for improving pain related to surgical fixation of distal radius fractures.

#### **METHODS:**

The present double-blinded, placebo-controlled, randomized clinical trial involved 48 patients who were undergoing surgical fixation of distal radius fractures. Participants were randomly assigned to either an intervention group (n=24), who received 808 nm laser irradiation as 4 J/point for 20 s over ipsilateral three nerve roots in the cervical region corresponding to C5-C8 vertebrae, and 808 nm laser irradiation as 0.1 J/cm<sup>2</sup> for 5 min in a tangential scanning mode over the affected extremity; or a control group (n=24), who underwent the same protocol and timing of laser probe application with the laser switched off. Both groups received the same IVRA protocol using 2% lidocaine.

#### **RESULTS:**

The mean visual analogue scale scores were significantly lower in the laser-assisted group than in the lidocaine-only group on all measurements during and after operation (P<0.05). The mean time to the first need for fentanyl administration during the operation was longer in the laser group (P=0.04). The total amount of fentanyl administered to patients was significantly lower in the laser-assisted group (P=0.003). The laser group needed significantly less pethidine for pain relief (P=0.001) and at a later time (P=0.002) compared with the lidocaine-only group. There was no difference between the groups in terms of mean arterial pressure and heart rate.

#### **CONCLUSION:**

The addition of gallium-aluminum-arsenide laser irradiation to intravenous regional anesthesia is safe, and reduces pain during and after the operation.

[Photomed Laser Surg.](#) 2014 Jun;32(6):336-44. doi: 10.1089/pho.2013.3563.

## **Placebo-controlled investigation of low-level laser therapy to treat carpal tunnel syndrome.**

[Lazovic M](#)<sup>1</sup>, [Ilic-Stojanovic O](#), [Kocic M](#), [Zivkovic V](#), [Hrkovic M](#), [Radosavljevic N](#).  
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### **Abstract**

#### **OBJECTIVE:**

This study investigated the short-term efficacy of low-level laser therapy (LLLT) in patients with mild to moderate carpal tunnel syndrome (CTS), lasting for <1 year.

#### **METHODS:**

Seventy-nine patients with CTS were included in this double-blind, placebo-controlled

study, and randomly divided in two treatment groups: Experimental group (EG), active laser group (40 patients); and control group (CG), placebo (sham) laser group (39 patients). A GaAlAs diode laser [780 nm, 30 mW continuous wave (CW), 0.785 cm<sup>2</sup>, 38.2 mW/cm<sup>2</sup>] was applied in contact with four points perpendicularly to the skin over the carpal tunnel area for 90 sec per point (2.7 J, 3.4 J/cm<sup>2</sup>/point). Both groups were treated five times per week, once a day over 2 weeks, followed by 10 treatments every other day for 3 weeks, that is, for a total of 20 treatments. Clinical assessment, including visual analogue scale (VAS) pain rating, Tinel's sign, and median nerve conduction studies (NCSs) were evaluated before, and 3 weeks after, the last LLLT treatment.

### **RESULTS:**

Significant reduction in pain, reduction in the percentage of patients with a positive Tinel's sign, and shortening of sensory and motor latency time in the NCS examination was observed in the experimental LLLT group (but not in the control group).

### **CONCLUSIONS:**

This study has observed and documented the statistically significant short-term effects of LLLT on CTS patients in comparison with a placebo group. The results support this conclusion, especially if the LLLT is applied in the earlier stages of CTS, and with mild to moderate cases.

[Med Oral Patol Oral Cir Bucal](#). 2014 Jul 1;19(4):e327-34.

### **Low-level laser effect in patients with neurosensory impairment of mandibular nerve after sagittal split ramus osteotomy. Randomized clinical trial, controlled by placebo.**

[Führer-Valdivia A<sup>1</sup>](#), [Noguera-Pantoja A](#), [Ramírez-Lobos V](#), [Solé-Ventura P](#).

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### **Abstract**

#### **OBJECTIVE:**

Evaluate the effect on the application of low level laser therapy, in patients that have been previously intervened with a sagittal ramus split osteotomy and present neurosensory impairment due to this surgery, compared with placebo.

#### **STUDY DESIGN:**

This preliminary study is a randomized clinical trial, with an experimental group (n=17) which received laser light and a control group (n=14), placebo. All participants received laser applications, divided after surgery in days 1, 2, 3, 5, 10, 14, 21 and 28. Neurosensory impairment was evaluated clinically with 5 tests; visual analog scale (VAS) for pain and sensitivity, directional and 2 point discrimination, thermal discrimination, each one of them performed before and after surgery on day 1, and 1, 2 and 6 months. Participants and results evaluator were blinded to intervention. Variables were described with absolute frequencies, percentages and medians. Ordinal and dichotomous variables were compared with Mann Whitney's and Fisher's test respectively.

#### **RESULTS:**

RESULTS demonstrate clinical improvement in time, as well as in magnitude of neurosensory return for laser group; VAS for sensitivity reached 5 (normal), 10 participants recovered initial values for 2 point discrimination (62,5%) and 87,5% recovered directional discrimination at 6 months after surgery. General VAS for sensitivity showed 68,75% for laser group, compared with placebo 21,43% (p-value = (0.0095)). Left side sensitivity (VAS) showed 3.25 and 4 medians for placebo and laser at 2 months, respectively (p-value = (0.004)).

## CONCLUSION:

Low-level laser therapy was beneficial for this group of patients on recovery of neurosensory impairment of mandibular nerve, compared to a placebo.

[Radiother Oncol.](#) 2013 Nov;109(2):297-302. doi: 10.1016/j.radonc.2013.08.010. Epub 2013 Sep 14.

## Phase III trial of low-level laser therapy to prevent oral mucositis in head and neck cancer patients treated with concurrent chemoradiation.

[Antunes HS<sup>1</sup>](#), [Herchenhorn D](#), [Small IA](#), [Araújo CM](#), [Viégas CM](#), [Cabral E](#), [Rampini MP](#), [Rodrigues PC](#), [Silva TG](#), [Ferreira EM](#), [Dias FL](#), [Ferreira CG](#).

### Author information

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## Abstract

### BACKGROUND:

Oral mucositis (OM) is a complication of chemoradiotherapy treatment of head and neck squamous cell carcinoma (HNSCC) patients with no effective therapy. This study was designed to assess the efficacy of preventive low-level laser therapy (LLLT) in reducing the incidence of grade 3-4 OM.

### MATERIAL AND METHODS:

From June 2007 to December 2010, 94 HNSCC patients entered a prospective, randomized, double-blind, placebo-controlled phase III trial. Chemoradiotherapy consisted of conventional radiotherapy plus concurrent cisplatin every 3 weeks. A diode InGaAlP (660nm-100mW-1J-4J/cm<sup>2</sup>) was used. OM evaluation was performed by WHO and OMAS scales and quality of life by EORTC questionnaires (QLQ).

### RESULTS:

A six-fold decrease in the incidence of grades 3-4 OM was detected in the LLLT group compared to the placebo; (6.4% versus 40.5%). LLLT impacted the incidence of grades 3-4 OM to a relative risk ratio of 0.158 (CI 95% 0.050-0.498). After treatment QLQ-C30 showed, differences favoring LLLT in physical, emotional functioning, fatigue, and pain; while the QLQ-H&N35 showed improvements in LLLT arm for pain, swallowing, and trouble with social eating.

### CONCLUSION:

Preventive LLLT in HNSCC patients receiving chemoradiotherapy is an effective tool for reducing the incidence of grade 3-4 OM. Efficacy data were corroborated by improvements seen in quality of life.

[Clin Rehabil.](#) 2012 Jun;26(6):523-33. doi: 10.1177/0269215511425962. Epub 2011 Dec 14.

## Efficacy of low level laser therapy associated with exercises in knee osteoarthritis: a randomized double-blind study.

[Alfredo PP<sup>1</sup>](#), [Bjordal JM](#), [Dreyer SH](#), [Meneses SR](#), [Zaguetti G](#), [Ovanessian V](#), [Fukuda TY](#), [Junior WS](#), [Lopes Martins RA](#), [Casarotto RA](#), [Marques AP](#).

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## **Abstract**

### **OBJECTIVES:**

To estimate the effects of low level laser therapy in combination with a programme of exercises on pain, functionality, range of motion, muscular strength and quality of life in patients with osteoarthritis of the knee.

### **DESIGN:**

A randomized double-blind placebo-controlled trial with sequential allocation of patients to different treatment groups.

### **SETTING:**

Special Rehabilitation Services.

### **SUBJECTS:**

Forty participants with knee osteoarthritis, 2-4 osteoarthritis degree, aged between 50 and 75 years and both genders.

### **INTERVENTION:**

Participants were randomized into one of two groups: the laser group (low level laser therapy dose of 3 J and exercises) or placebo group (placebo laser and exercises).

### **MAIN MEASURES:**

Pain was assessed using a visual analogue scale (VAS), functionality using the Lequesne questionnaire, range of motion with a universal goniometer, muscular strength using a dynamometer, and activity using the Western Ontario and McMaster Universities Osteoarthritis (WOMAC) questionnaire at three time points: (T1) baseline, (T2) after the end of laser therapy (three weeks) and (T3) the end of the exercises (11 weeks).

### **RESULTS:**

When comparing groups, significant differences in the activity were also found ( $P = 0.03$ ). No other significant differences ( $P > 0.05$ ) were observed in other variables. In intragroup analysis, participants in the laser group had significant improvement, relative to baseline, on pain ( $P = 0.001$ ), range of motion ( $P = 0.01$ ), functionality ( $P = 0.001$ ) and activity ( $P < 0.001$ ). No significant improvement was seen in the placebo group.

### **CONCLUSION:**

Our findings suggest that low level laser therapy when associated with exercises is effective in yielding pain relief, function and activity on patients with osteoarthritis of the knees.

[Support Care Cancer](#). 2012 Jul;20(7):1405-15. doi: 10.1007/s00520-011-1223-8. Epub 2011 Jul 3.

## **Amelioration of oral mucositis pain by NASA near-infrared light-emitting diodes in bone marrow transplant patients.**

[Hodgson BD](#)<sup>1</sup>, [Margolis DM](#), [Salzman DE](#), [Eastwood D](#), [Tarima S](#), [Williams LD](#), [Sande JE](#), [Vaughan WP](#), [Whelan HT](#).

### **Author information**

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## **Abstract**

### **PURPOSE:**

This study seeks to investigate the use of extra-orally applied near-infrared phototherapy for the reduction of oral pain secondary to chemotherapy- and radiation therapy-induced mucositis in adult and pediatric hematopoietic stem cell transplant (HSCT) patients.

### **METHODS:**

Eighty HSCT patients were divided into regular (R) and low (L) risk groups, then to experimental (E) and placebo (P) groups, resulting in four groups (ER, EL, PR, PL). Experimental subjects received 670 ( $\pm$  10) nm gallium-aluminum-arsenide light-emitting diode device for 80 s at  $\sim$ 50 mW/cm<sup>2</sup> energy density and power exposure of 4 J/cm<sup>2</sup>. Placebo patients received the same procedures, but with a placebo phototherapy (identical device but  $<$ 5 mW/cm<sup>2</sup> energy density). Patients received their respective light therapy once per day starting on the day of the HSCT (day 0) and continued through day +14. Blinded evaluators examined the patients three times per week and scored their oral tissues and patient-reported pain assessments at each evaluation utilizing the WHO, NCI-CTCAE, and OMAS scales.

### **RESULTS:**

Analysis of the mean scores at each observation demonstrate that the extra-oral application of phototherapy resulted in a significant reduction in patient-reported pain between the ER and PR patients ( $p < 0.05$ ) at day +14 when graded via the WHO criteria. The ER and EL patients were improved in almost all other categories and assessment scales, but the differences were not statistically significant.

### **CONCLUSION:**

Phototherapy demonstrated a significant reduction in patient-reported pain as measured by the WHO criteria in this patient population included in this study. Improvement trends were noted in most other assessment measurements.

[Pain Med.](#) 2010 Aug;11(8):1169-78. doi: 10.1111/j.1526-4637.2010.00907.x.

### **Low-level laser therapy for acute neck pain with radiculopathy: a double-blind placebo-controlled randomized study.**

[Konstantinovic LM](#)<sup>1</sup>, [Cutovic MR](#), [Milovanovic AN](#), [Jovic SJ](#), [Dragin AS](#), [Letic MDj](#), [Miler VM](#).  
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## **Abstract**

### **OBJECTIVE:**

The objective of the study was to investigate clinical effects of low-level laser therapy (LLLT) in patients with acute neck pain with radiculopathy.

### **DESIGN:**

Double-blind, randomized, placebo-controlled study.

### **SETTING:**

The study was carried out between January 2005 and September 2007 at the Clinic for Rehabilitation at the Medical School, University of Belgrade, Serbia.



## **PATIENTS AND INTERVENTION:**

Sixty subjects received a course of 15 treatments over 3 weeks with active or an inactivated laser as a placebo procedure. LLLT was applied to the skin projection at the anatomical site of the spinal segment involved with the following parameters: wavelength 905 nm, frequency 5,000 Hz, power density of 12 mW/cm<sup>2</sup>, and dose of 2 J/cm<sup>2</sup>, treatment time 120 seconds, at whole doses 12 J/cm<sup>2</sup>.

## **OUTCOME MEASURES:**

The primary outcome measure was pain intensity as measured by a visual analog scale. Secondary outcome measures were neck movement, neck disability index, and quality of life. Measurements were taken before treatment and at the end of the 3-week treatment period.

## **RESULTS:**

Statistically significant differences between groups were found for intensity of arm pain ( $P = 0.003$ , with high effect size  $d = 0.92$ ) and for neck extension ( $P = 0.003$  with high effect size  $d = 0.94$ ).

## **CONCLUSION:**

LLLT gave more effective short-term relief of arm pain and increased range of neck extension in patients with acute neck pain with radiculopathy in comparison to the placebo procedure.

[Photomed Laser Surg.](#) 2009 Aug;27(4):577-84. doi: 10.1089/pho.2008.2297.

## **The effect of low-level laser in knee osteoarthritis: a double-blind, randomized, placebo-controlled trial.**

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## **Abstract**

### **INTRODUCTION:**

Low-level laser therapy (LLLT) is thought to have an analgesic effect as well as a biomodulatory effect on microcirculation. This study was designed to examine the pain-relieving effect of LLLT and possible microcirculatory changes measured by thermography in patients with knee osteoarthritis (KOA).

### **MATERIALS AND METHODS:**

Patients with mild or moderate KOA were randomized to receive either LLLT or placebo LLLT. Treatments were delivered twice a week over a period of 4 wk with a diode laser (wavelength 830 nm, continuous wave, power 50 mW) in skin contact at a dose of 6 J/point. The placebo control group was treated with an ineffective probe (power 0.5 mW) of the same appearance. Before examinations and immediately, 2 wk, and 2 mo after completing the therapy, thermography was performed (bilateral comparative thermograph by AGA infrared camera); joint flexion, circumference, and pressure sensitivity were measured; and the visual analogue scale was recorded.

### **RESULTS:**

In the group treated with active LLLT, a significant improvement was found in pain (before treatment [BT]: 5.75; 2 mo after treatment : 1.18); circumference (BT: 40.45; AT: 39.86); pressure sensitivity (BT: 2.33; AT: 0.77); and flexion (BT: 105.83; AT: 122.94). In the placebo group, changes in joint flexion and pain were not significant. Thermographic measurements showed at least a 0.5 degrees C increase in temperature--

and thus an improvement in circulation compared to the initial values. In the placebo group, these changes did not occur.

### **CONCLUSION:**

Our results show that LLLT reduces pain in KOA and improves microcirculation in the irradiated area.

[Cranio](#). 2007 Jul;25(3):186-92.

### **Low intensity laser application in temporomandibular disorders: a phase I double-blind study.**

[Mazzetto MO](#)<sup>1</sup>, [Carrasco TG](#), [Bidinelo EF](#), [de Andrade Pizzo RC](#), [Mazzetto RG](#).

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#### **Abstract**

The purpose of this study was to evaluate the effectiveness of low intensity laser therapy (LILT) for the control of pain from temporomandibular disorder (TMD) in a random and double-blind research design. Forty-eight (48) patients presenting temporomandibular joint (TMJ) pain were divided into an experimental group (GI) and a placebo group (GII). The sample was submitted to the treatment with infrared laser (780 nm, 70 mW, 10 s, 89.7 J/cm<sup>2</sup>) applied in continuous mode on the affected temporomandibular region, at one point: inside the external auditive duct toward the retrodiskal region, twice a week, for four weeks. For the control group, two identical probes (one active and one that does not emit radiation) were used unknown by the clinician and the subjects. A tip planned for laser acupuncture was used and connected to the active point of the probe. The parameter evaluated was the intensity of pain after palpation of the condylar lateral pole, pre-auricular region and external auditive duct, according to the Visual Analogue Scale (VAS). Four evaluations were performed: Ev1 (before laser application), Ev2 (after 4th application), Ev3 (after 8th application) and Ev4 (30 days after the last application). Data were submitted to statistical analysis. The results showed a decrease in the pain level mainly for the active probe. Among the evaluations, the Ev3 exhibited lower sensitivity to palpation. In conclusion, the results show that low intensity laser is an effective therapy for the pain control of subjects with TMD.

[Br J Sports Med](#). 2006 Jan;40(1):76-80; discussion 76-80.

### **A randomised, placebo controlled trial of low level laser therapy for activated Achilles tendinitis with microdialysis measurement of peritendinous prostaglandin E2 concentrations.**

[Bjordal JM](#)<sup>1</sup>, [Lopes-Martins RA](#), [Iversen VV](#).

#### **Author information**

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#### **Abstract**

#### **BACKGROUND:**

Low level laser therapy (LLLT) has gained increasing popularity in the management of tendinopathy and arthritis. Results from in vitro and in vivo studies have suggested that inflammatory modulation is one of several possible biological mechanisms of LLLT action.

#### **OBJECTIVE:**

To investigate in situ if LLLT has an anti-inflammatory effect on activated tendinitis of the human Achilles tendon.

#### **SUBJECTS:**

Seven patients with bilateral Achilles tendinitis (14 tendons) who had aggravated symptoms produced by pain inducing activity immediately before the study.

#### **METHOD:**

Infrared (904 nm wavelength) LLLT (5.4 J per point, power density 20 mW/cm<sup>2</sup>) and placebo LLLT (0 J) were administered to both Achilles tendons in random blinded order.

#### **RESULTS:**

Ultrasonography Doppler measurements at baseline showed minor inflammation through increased intratendinous blood flow in all 14 tendons and measurable resistive index in eight tendons of 0.91 (95% confidence interval 0.87 to 0.95). Prostaglandin E<sub>2</sub> concentrations were significantly reduced 75, 90, and 105 minutes after active LLLT compared with concentrations before treatment ( $p = 0.026$ ) and after placebo LLLT ( $p = 0.009$ ). Pressure pain threshold had increased significantly ( $p = 0.012$ ) after active LLLT compared with placebo LLLT: the mean difference in the change between the groups was 0.40 kg/cm<sup>2</sup> (95% confidence interval 0.10 to 0.70).

#### **CONCLUSION:**

LLLT at a dose of 5.4 J per point can reduce inflammation and pain in activated Achilles tendinitis. LLLT may therefore have potential in the management of diseases with an inflammatory component.

[J Rheumatol.](#) 2004 Dec;31(12):2408-12.

#### **Low level laser therapy in primary Raynaud's phenomenon--results of a placebo controlled, double blind intervention study.**

[Hirsch M<sup>1</sup>](#), [Katzenschlager R](#), [Francesconi C](#), [Kundi M](#).  
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#### **Abstract**

#### **OBJECTIVE:**

To assess the efficacy of low level laser therapy in patients with primary Raynaud's phenomenon and predict the success of laser therapy by clinical characteristics.

#### **METHODS:**

Forty-eight patients were included in a randomized placebo controlled, double blind crossover study. Laser and sham therapy each were applied 5 days a week for 3 weeks. Clinical symptoms, exposure to triggers, and frequency and intensity of attacks were recorded in diaries. Results of infrared thermography before onset and at the end of both irradiation sequences were evaluated. Primary endpoint was the average intensity of attacks; secondary endpoints were average number of attacks and thermography results. Age, sex, duration of symptoms, age at onset of symptoms, evoking conditions other than cold, maximum temperature drop after cold provocation, and rewarming time after cold provocation were tested as potential predictors.

#### **RESULTS:**

Number of attacks and their intensity were significantly reduced during laser therapy compared to sham treatment. Thermographic parameters did not reach statistical significance. In a stepwise multiple regression analysis, evoking conditions other than

cold (stress, wetness as additional triggers), rewarming time, and temperature decrease after cold provocation were significant predictors of therapeutic efficacy.

## **CONCLUSION:**

Low level laser therapy reduces frequency and severity of Raynaud attacks. The effect is most pronounced in patients with signs of decreased threshold for vasospasm and less effective in patients with delayed hyperemia.

[Lasers Surg Med.](#) 2004;35(3):229-35.

## **Efficacy of 904 nm gallium arsenide low level laser therapy in the management of chronic myofascial pain in the neck: a double-blind and randomize-controlled trial.**

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## **Abstract**

### **BACKGROUND AND OBJECTIVES:**

A prospective, double-blind, randomized, and controlled trial was conducted in patients with chronic myofascial pain syndrome (MPS) in the neck to evaluate the effects of infrared low level 904 nm Gallium-Arsenide (Ga-As) laser therapy (LLLT) on clinical and quality of life (QoL).

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

The study group consisted of 60 MPS patients. Patients were randomly assigned to two treatment groups: Group I (actual laser; 30 patients) and Group II (placebo laser; 30 patients). LLLT continued daily for 2 weeks except weekends. Follow-up measures were evaluated at baseline, 2, 3, and 12 weeks. All patients were evaluated with respect to pain at rest, pain at movement, number of trigger points (TP), the Neck Pain and Disability Visual Analog Scale (NPAD), Beck depression Inventory (BDI), and the Nottingham Health Profile (NHP).

### **RESULTS:**

In active laser group, statistically significant improvements were detected in all outcome measures compared with baseline ( $P < 0.01$ ) while in the placebo laser group, significant improvements were detected in only pain score at rest at the 1 week later of the end of treatment. The score for self-assessed improvement of pain was significantly different between the active and placebo laser groups (63 vs. 19%) ( $P < 0.01$ ).

### **CONCLUSION:**

This study revealed that short-period application of LLLT is effective in pain relief and in the improvement of functional ability and QoL in patients with MPS.

