

Analysis of laser therapy and assessment methods in the rehabilitation of temporomandibular disorder: a systematic review of the literature.

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Abstract

The aim of the present study was to perform a systematic review of the literature on the effects of low-level laser therapy in the treatment of TMD, and to analyze the use of different assessment tools. [Subjects and Methods] Searches were carried out of the BIREME, MEDLINE, PubMed and SciELO electronic databases by two independent researchers for papers published in English and Portuguese using the terms: "temporomandibular joint laser therapy" and "TMJ laser treatment". [Results] Following the application of the eligibility criteria, 11 papers were selected for in-depth analysis. The papers analyzed exhibited considerable methodological differences, especially with regard to the number of sessions, anatomic site and duration of low-level laser therapy irradiation, as well as irradiation parameters, diagnostic criteria and assessment tools. [Conclusion] Further studies are needed, especially randomized clinical trials, to establish the exact dose and ideal parameters for low-level laser therapy and define the best assessment tools in this promising field of research that may benefit individuals with signs and symptoms of TMD.

Comparative evaluation of low-level laser and systemic steroid therapy in adjuvant-enhanced arthritis of rat temporomandibular joint: A histological study.

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Abstract

BACKGROUND:

Low-level laser therapy (LLLT) has shown a promising effect in ameliorating symptoms of rheumatoid arthritis (RA). The aim of this investigation was to compare the early and late anti-inflammatory effects of LLLT and betamethasone in RA.

MATERIALS AND METHODS:

In this animal experimental study, after inducing a model of RA in temporomandibular joint (TMJ) of 37 Wistar rats using adjuvant injection, they were randomly distributed into three experimental groups of 12 animals each: (1) LLLT group; (2) steroid group which received a single dose of betamethasone systemically; and (3) positive control group, which did not receive any treatment. One rat served as the negative control. Half of the animals in all the experimental groups were sacrificed on the 21(st) day after RA induction (early phase), and the other half were sacrificed 2 weeks later (late phase). Then, the severity of TMJ inflammation was assessed histologically in each group on a semi-quantitative scale. Kruskal-Wallis and Mann-Whitney tests were used to compare differences ($\alpha = 0.05$).

RESULTS:

The LLLT and steroid groups showed significantly ($P < 0.05$) lower inflammation mean scores in both early (5.66 [± 1.86] and 1.66 [± 1.21], respectively) and late phases of evaluation (1.16 [± 1.47] and 6.50 [± 1.04], respectively) compared to positive control group in early and late stages of assessment (11.66 [± 3.50] and 8.66 [± 1.36], respectively). However, the best results ($P < 0.005$) were achieved in early phase of the steroid group as well as late phase of the LLLT group.

CONCLUSION:

Within limitations of this study, it may be concluded that LLLT method has a long-term promising effect on reducing inflammation severity of TMJ similar to betamethasone in earlier stages.

Laser therapy reduces gelatinolytic activity in the rat trigeminal ganglion during temporomandibular joint inflammation.

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Abstract

OBJECTIVES:

To investigate whether low-level laser therapy (LLLT) alters the expression and activity of MMP-2 and MMP-9 in the trigeminal ganglion (TG) during different stages of temporomandibular joint (TMJ) inflammation in rats. It also evaluated whether LLLT modifies mechanical allodynia and orofacial hyperalgesia.

MATERIALS AND METHODS:

Wistar rats (± 250 g) were divided into groups that received saline (SAL) or complete Freund's adjuvant (CFA, 50 μ l) in the TMJ, and that later underwent LLLT (20 J cm^{-2}) at their TMJ or not (groups SAL, SAL + LLLT, CFA, and CFA + LLLT). LLLT was applied on days 3, 5, 7, and 9 after SAL or CFA. Mechanical allodynia was evaluated on days 1, 3, 5, 7, and 10; orofacial hyperalgesia was assessed on day 10. Gelatin zymography and in situ zymography aided quantification of MMPs in the TG.

RESULTS:

Low-level laser therapy abolished the reduction in the mechanical orofacial threshold and the increase in orofacial rubbing during the orofacial formalin test induced by CFA. LLLT also decreased the CFA-induced rise in the levels of MMP-9 and MMP-2 as well as the gelatinolytic activity in the TG.

CONCLUSION:

Low-level laser therapy could constitute an adjuvant therapy to treat temporomandibular disorders and prevent inflammation-induced alterations in the levels of MMP-2 and MMP-9 and in the gelatinolytic activity in TGs.

Efficacy of low-level laser therapy in the treatment of TMDs: a meta-analysis of 14 randomised controlled trials.

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Abstract

This study was designed to evaluate the efficacy of low-level laser therapy (LLLT) in the treatment of temporomandibular disorders (TMDs). We searched electronic databases and references lists of relevant articles, retrieved all of the published randomised controlled trials in regard to these issues and then performed a meta-analysis. Fourteen highly qualified RCTs reporting on a total of 454 patients, which evaluated the effectiveness of LLLT for patients suffering from TMDs were retrieved. The results indicated that LLLT was not better than placebo in reducing chronic TMD pain (weighted mean difference = -19.39; 95% confidence interval = -40.80-2.03; $P < 0.00001$; $I(2) = 99\%$). However, the LLLT provided significant better functional outcomes in terms of maximum active vertical opening (MAVO) (weighted mean difference = 4.18; 95% confidence interval = 0.73-7.63; $P = 0.006$; $I(2) = 73\%$), maximum passive vertical opening (MPVO) (weighted mean difference = 6.73; 95% confidence interval = 0.1-12.34; $P = 0.06$; $I(2) = 73\%$), protrusion excursion (PE) (weighted mean difference = 1.81; 95% confidence interval = 0.79-2.83; $P = 0.59$; $I(2) = 0\%$) and right lateral excursion (RLE) (weighted mean difference = 2.86; 95% confidence interval = 1.27-4.45; $P = 0.01$; $I(2) = 73\%$). The results of our meta-analysis have provided the best evidence on the efficacy of LLLT in the treatment of TMDs. This study indicates that using LLLT has limited efficacy in reducing pain in patients with TMDs. However, LLLT can significantly improve the functional outcomes of patients with TMDs.

[Cranio](#). 2014 Jan;32(1):51-6.

Efficacy of red and infrared lasers in treatment of temporomandibular disorders--a double-blind, randomized, parallel clinical trial.

[Pereira TS](#), [Flecha OD](#), [Guimarães RC](#), [de Oliveira D](#), [Botelho AM](#), [Ramos Glória JC](#), [Aguiar Tavano KT](#).

Abstract

AIM:

Low-level laser therapy has still not been well established, and it is important to define a standardized protocol for the treatment of temporomandibular disorders (TMDs) using low level laser. There is no consensus on controlled clinical trials concerning the best option for laser therapy with regard to wavelength. The aim of this study was to evaluate the efficacy of red and infrared laser therapy in patients with TMD, using a randomized parallel-group double-blind trial.

METHODOLOGY:

Each hemiface of 19 subjects was randomized to receive intervention, in a total of 116 sensitive points. Pain was measured at baseline and time intervals of 24 hours, 30 days, 90 days, and 180 days after treatment. Irradiation of 4 J/cm² in the temporomandibular joints and 8 J/cm² in the muscles was used in three sessions.

RESULTS:

Both treatments had statistically significant results ($P < 0.001$); there was statistical difference between them at 180 days in favor of the infrared laser ($P = 0.039$). There was improvement in 24 hours, which extended up to 180 days in both groups.

CONCLUSION:

Both lasers are effective in the treatment and remission of TMD symptoms.

Evaluation of pain, jaw movements, and psychosocial factors in elderly individuals with temporomandibular disorder under laser phototherapy.

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Abstract

Few studies have been carried out on the application of laser phototherapy (LPT) for treating painful temporomandibular disorder (TMD) in elderly population that is growing worldwide. The aim of the present study was to evaluate the pain, jaw movements, and psychosocial factors in ten elderly patients with painful TMD before and after LPT. All patients were evaluated before and after LPT by using the Research Diagnostic Criteria for temporomandibular disorders (RDC/TMD) axes I and II. For pain assessment, a visual analogue scale (VAS) was used. The LPT was carried out with an GaAlAs diode laser (780 nm; spot size 0.04 cm²) in punctual and contact mode. Two settings of irradiations were applied as follows: in patients presenting myofascial pain, 10 mW, 5 J/cm², 20 s, 0.2 J per application point; and in patients with joint TMD, 70 mW, 105 J/cm², 60 s on five points, 4.2 J per point. Two sessions of LPT were carried out per week over four consecutive weeks, in the total of eight sessions. Data was statistically analyzed ($p < 0.05$). Significant pain reduction was found in all patients. There were increase in maximum mouth opening without pain and reduction in muscle pain during right and left lateral excursion. A significant reduction in chronic pain severity ($p = 0.02$) and significant improvements in depression ($p = 0.038$) and nonspecific physical symptoms with pain ($p = 0.0167$) were observed. The present findings indicate that LPT is able to promote pain relief and improvement of jaw movements in elderly patients with TMD, with a positive effect on psychosocial aspects.

Laser Therapy and Occlusal Stabilization Splint for Temporomandibular Disorders in Patients With Fibromyalgia Syndrome: A Randomized, Clinical Trial.

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Context • Patients with fibromyalgia syndrome (FMS) report frequent and severe symptoms from temporomandibular disorders (TMDs). The appropriate treatment of TMDs remains controversial. No studies have occurred on the efficacy of therapy with a laser or an occlusal stabilization splint in the treatment of TMDs in patients with FMS. **Objective** • The study intended to investigate the therapeutic effects of laser therapy and of an occlusal stabilization splint for reducing pain and dysfunction and improving the quality of sleep in patients with TMDs and FMS. **Design** • The research team designed a single-blinded, randomized clinical trial. **Setting** • The study took place in the research laboratory at the University of Granada (Granada, Spain). **Participants** • Participants were 58 women and men who had been diagnosed with FMS and TMDs and who were referred from the clinical setting. **Intervention** • Participants were randomly assigned to the occlusal-splint or the laser group. The laser group received a treatment protocol in which laser therapy was applied to the participant's tender points, and the occlusal-splint group underwent a treatment protocol in which an occlusal stabilization splint was used. Both groups underwent treatment for 12 wk. **Outcomes Measures** • Pain intensity, widespread pain, quality of sleep, severity of symptoms, active and passive mouth opening, and joint sounds were assessed in both groups at baseline and after the last intervention. The measurements used were (1) a visual analogue scale (VAS), (2) the Widespread Pain Index (WPI), (3) the Symptom Severity Scale (SSS), (4) the Patient's Global Impression of Change (PGIC), (5) the Pittsburgh Quality of Sleep Questionnaire Index (PSQI), (6) an assessment of the number of tender points, (7) a measurement of the active mouth opening, (8) a measurement of the vertical overlap of the incisors, and (9) the measurement of joint sounds during mouth opening and closing. **Results** • The group X time interaction for the 2 × 2 mixed analysis of variance found no statistically significant differences between the 2 treatment groups: (1) VAS, $P = .591$; (2) WPI, $P = .112$; (3) SSS, $P = .227$; (4) PGIC, $P = .329$; (5) number of tender points, $P = .107$; (6) right and left clicking sounds in the jaw joint during palpation at mouth opening, $P = .723$ and $P = .121$, respectively; and (7) right and left clicking sounds in the jaw joint during palpation at mouth closing, $P = .743$ and $P = .698$, respectively. Compared with baseline, the laser treatment showed significant improvements on several outcomes, including the VAS, $P < .001$; WPI, $P = .003$; and SSS, $P = .001$. Overall, the study found an average improvement in symptoms from baseline of 21% , $P < .001$, based on the PGIC. **Conclusions** • Laser therapy or an occlusal stabilization splint

can be an alternative therapeutic treatment for reducing pain symptoms and the clicking sound for TMDs in patients with FMS.