



## Laser therapy on points of acupuncture: Are there benefits in dentistry?



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### ABSTRACT

Studies have shown the use of laser therapy at points of acupuncture as an alternative to metal needles. The scientific literature in the area of laser acupuncture is rather large; however, the actual mechanisms and effects have not yet been proven in detail. Therefore, the current manuscript reviews the existing literature regarding the effects of laser acupuncture in Dentistry, seeking treatment modalities in which this technique is used and which are able to generate positive clinical results. Thus, the literature survey was conducted in electronic databases – Medline/Pubmed, VHL and Science Direct – using the uniterms “alternative medicine”, “low-power laser and acupuncture”, “laser acupuncture and dentistry” and “laser therapy and acupuncture”. Retrospective and prospective clinical studies were considered. According to the findings of the literature, laser therapy at points of acupuncture was effective for the treatment of various orofacial problems encountered in dentistry, but there are still many differences among the parameters used for irradiation and there is a lack of important information reported by the studies, such as the wavelength, dose, power density, irradiation time and frequency, points of acupuncture selected for irradiation and therapy outcomes. Although these results indicate the potential benefit of the use of laser therapy at points of acupuncture on Dentistry, further double-blinded, controlled clinical trials should be carried out in order to standardize protocols for clinical application.

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### 1. Introduction

Acupuncture is a Chinese therapeutic method originated over 3000 years ago, which is based on the insertion of needles into specific points on the body called acupuncture points to stimulate the central nervous system and peripheral release neurotransmitters that promote the process of restoration and maintenance of health [1–3]. Even though the metal needles are proven to be effective in their therapeutic purposes, the technique is not widely accepted due to fear of possible contamination or transcutaneous lesion [4]. For this reason, studies have proposed the use of low power laser on acupuncture points, following the principles of traditional Chinese medicine and making a new therapeutic approach, known as laser acupuncture (LA) [4–6].

Laser acupuncture is defined as the stimulation of traditional acupuncture points with low power lasers, with no thermal effect resulting from the laser irradiation [3]. In laser acupuncture (LA),

laser irradiation is done transcutaneously to a single, anatomically defined acupuncture point, many of which overlie the course of peripheral nerves [7]. Such laser irradiation is reported to affect neural response in the same way as needle acupuncture [8,9]. In contrast to LA, low power laser therapy solely involves the irradiation of multiple tender points at the sites of pathology [10].

Laser acupuncture has been clinically applied since the 1970s. Friedrich Plog was one of the first researchers that used the laser stimulation on acupuncture points [11]. These studies were pre-dated by work in the Union of Soviet Socialist Republics, conducted between 1970 and 1972, and reported the laser acupuncture to be a successful treatment for hypertension and asthma [12,13].

The stimulation of an acupuncture point with the low power laser is not only painless [14] but also has the advantage of being a noninvasive, atraumatic and consist on an easy method to be performed by a qualified professional [15]. Other advantages include reduced treatment time, low risk of infection and may be ideal for patients with fear of needles [16,17].

To date, few studies have demonstrated the effectiveness of laser therapy on acupuncture points for dental procedures [4,18–23]. Studies show that LA can be used in dentistry to treat

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temporomandibular dysfunction [4,18–21]; myofascial pain [22]; gagging reflex [23]. Although the technique has been shown to be effective for the treatment and prevention of problems related to the stomatognathic system [3–6], there are still many open questions concerning technical parameters of this innovative technique.

In 2008 [5], a review of literature on the clinical effectiveness of laser acupuncture on myofascial pain, postoperative nausea and vomiting and for the relief of chronic tension headache has been published. However, throughout the last seven years, other clinical studies have been published elucidating important aspects of laser acupuncture in Dentistry. Therefore, the aim of this article was to search on the scientific literature the existing information on laser acupuncture in Dentistry, seeking treatment modalities in which this technique is used and which are able to generate positive clinical results.

## 2. Methods

A literature survey was conducted by the authors of the study, in electronic databases – Medline/Pubmed, VHL and Science Direct – using the terms “alternative medicine”, “low power laser and acupuncture”, “laser acupuncture and dentistry” and “laser therapy and acupuncture”. This review included original scientific studies, published until March/2015, that fulfill the following criteria: retrospective and prospective clinical studies in which laser acupuncture was used; randomized clinical studies that considered a control group (either placebo, non-standard acupuncture or another treatment modality) and that clearly described the objectives, hypothesis, how sample size was determined, treatments for each experimental/control group, statistical methods used to compare groups for primary and secondary outcomes and numbers of participants who were randomly assigned for each group. Studies were published in a refereed scientific journal, with no restrictions regarding the year of publication. Studies reported in languages other than English were excluded. Also, conference abstracts, case reports and single-case studies were not considered. Studies in which TENS, electro acupuncture or acupuncture needles were evaluated were also not considered.

## 3. Results

A total of 10 original research publications were found and 3 were excluded. Among them, 5 have investigated the effects of LA on temporomandibular dysfunction, 1 in myofascial pain and 1 in gagging reflex. The details of each publication are described in Table 1.

### 3.1. Temporomandibular dysfunction

The effectiveness of laser acupuncture in the treatment of temporomandibular dysfunction was investigated in most of the studies reviewed. Hu et al. [18] conducted a retrospective observational study in 29 treatment-resistant TMD patients (25 women, 4 men; age range, 17–67 years). Subjects were treated 3 times per week for 4 weeks with a laser diode (wavelength of 810 nm). The visual analog scale (VAS) and maximal mouth opening (MMO) were evaluated before and after treatment. In 10 patients, the symptoms lasted for less than 6 months (acute TMD), and in the remaining patients, they lasted for more than 6 months (chronic TMD). VAS analysis showed that the patients were free of pain at rest (end-point) after  $5.90 \pm 6.08$  sessions of laser acupuncture for acute TMD and after  $16.21 \pm 17.98$  sessions for chronic TMD. They concluded that laser acupuncture therapy improves the symptoms of treatment-resistant TMD.

Huang et al. [19] conducted a clinical trial, in which 20 patients with TMD were treated with a low power laser with a wavelength of 800 nm, once a week until the patient felt that they no longer required the treatment or demonstrated no symptom improvement after three courses of treatment. The duration of pain was assessed by VAS at each visit and the maximum mouth opening was recorded before and after each treatment. Six patients underwent placebo laser acupuncture as control group. All the inclusion or exclusion criteria were mentioned as all the details of the interventions realized. This study demonstrated that, seventeen out of the 20 patients (85%) showed various degrees of pain relief after laser acupuncture treatment. Despite the positive results, the authors point out that it not possible to reach a firm conclusion on the effectiveness of laser acupuncture in the treatment of TMD due to the small sample size of this study. Authors who used the low power laser for treatment of TMD also had clinical success [4,22,24,25]. The physiological effects of laser therapy may include biostimulation, improvement of blood circulation, vasodilation, analgesia, anti-inflammatory and antiedematous effects, and an acceleration of wound healing.

Ferreira et al. [4] conducted a prospective, double-blinded, randomized, and placebo-controlled trial in patients with chronic temporomandibular disorder (TMD) to check the analgesic efficacy of the low power laser applied to acupuncture points. They used an infrared laser (780 nm) to evaluate for 3 months 40 patients with myofascial pain divided into two groups – 20 patients treated with the laser acupuncture technique and 20 treated with a placebo laser (no emitted irradiation). All the inclusion or exclusion criteria was mentioned as all the details of the interventions realized (wavelength, power output, energy intensity, the duration of application of the low power laser and the acupuncture points used) [26]. The VAS evaluation was issued once before any intervention (baseline) and then monthly until 12 therapeutic interventions had been completed. It recorded the spontaneous pain intensity and pain on palpation. They concluded that laser acupuncture was efficient in obtaining complete remission of the symptoms of temporomandibular and myofascial pain. According to Khaligh et al. [27] several studies of its review of laser therapy showed that the wavelength of 860 nm (infrared) was effective in reducing myofascial pain and that laser acupuncture is also effective, in agreement with the study of Ferreira [4].

Hotta et al., in 2010 [20], examined 10 patients with temporomandibular pain. Electromyographic examination (EMG) of the masseter and temporal muscles during normal occlusion and rest position, before and after treatment with laser acupuncture, was performed. After each session, EMG and pain measurement under VAS scale were conducted. Patients underwent 10 sessions in which the acupuncture points LI-4, HT-3, ST-6, ST-7 were irradiated for 20 s with an infrared emitting laser with power density of  $35 \text{ J/cm}^2$ . Despite positive results regarding pain relief and anxiety symptoms in patients with temporomandibular pain reported by the authors, the evaluation of mandibular movements showed no significant differences between groups. In contradiction to Hotta's study [20], La Touche et al. [28] reported that acupuncture is a reasonable adjunctive treatment for producing a short-term analgesic effect in patients with painful TMD symptoms and showed that the general function of the masticatory apparatus improved on patients with a TMD of muscular origin.

The study conducted by Pohodenko-Chudakova and Scarsella [21] evaluated 30 patients with temporomandibular dysfunction, divided into 2 groups. Fifteen patients were submitted to conventional rehabilitation treatment: orthopedic treatment, pain and antidepressive medications, muscle relaxants and therapy. The other 15 patients were treated with laser acupuncture for 10 sessions. Results were assessed under Electroencephalography (EEG), Electromyographic examination (EMG) and quantification

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