



ORIGINAL ARTICLE

Clinical effectiveness of laser acupuncture in the treatment of temporomandibular joint disorder



Yu-Feng Huang^{a,b}, Jung-Chih Lin^c, Hui-Wen Yang^{a,b},
Yu-Hsien Lee^{a,b}, Chuan-Hang Yu^{a,b,*}

^a School of Dentistry, College of Oral Medicine, Chung Shan Medical University, Taichung, Taiwan

^b Department of Dentistry, Oral Medicine Center, Chung Shan Medical University Hospital, Taichung, Taiwan

^c Department of Integrated Chinese and Western Medicine, Chung Shan Medical University Hospital, Taichung, Taiwan

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Background/Purpose: Temporomandibular joint disorder (TMD) is a general term for diseases of the temporomandibular joint and orofacial muscles. In this study, we tested whether laser acupuncture was effective for the treatment of TMD.

Methods: Twenty patients with TMD were treated with diode K-Laser (wavelength 800 nm, energy density 100.5 J/cm²) once a week at four acupuncture points including three standard ipsilateral local points (ST6, ST7, Ashi point) and one contralateral distal point (LI4). A 10-cm visual analogue scale (0 no pain and 10 the most severe pain) was used for measuring the pain intensity before and after the treatment.

Results: Seventeen out of 20 patients (85%) showed various degrees of pain relief after laser acupuncture treatment. The average pain score was 6.3 ± 1.6 before treatment and 2.5 ± 2.2 after treatment. Significant pain relief after laser acupuncture treatment was achieved ($p = 0.0003$, Wilcoxon signed rank test). The 17 patients showed an average pain relief of $63 \pm 31\%$. There were six patients who showed no TMD symptoms after an average of four treatments of laser acupuncture. The other 11 patients showed partial relief of TMD symptoms after treatment. Although the pain was still present, it was less and was acceptable. No side effects were reported in any patients during or after laser acupuncture treatments.

Conflicts of interest: The authors have no conflicts of interest relevant to this article.

* Corresponding author. Department of Dentistry, Oral Medicine Center, Chung Shan Medical University Hospital, No. 110 Chien-Kuo N. Road, Sec. 1, Taichung, Taiwan 40201, ROC.

E-mail address: tao2008@csmu.edu.tw (C.-H. Yu).

Conclusion: Laser acupuncture may be an alternative treatment modality for TMD because it is non-invasive, results in partial or total relief of pain, and has no side effects.

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Introduction

Temporomandibular joint disorder (TMD) is a general term for diseases of the temporomandibular joint (TMJ) and orofacial muscles. The symptoms and signs of TMD include pain in the TMJ and masticatory muscles, joint sounds and crepitus, joint locking, mandibular dysfunction, headache, and otalgia. The etiology of TMD is multifactorial and complex with occlusal, psychological, pathological and traumatic aspects.¹ Epidemiological studies reveal that up to 75% of the adult population have at least one sign of TMJ dysfunction and approximately 30% have more than one symptom, while only 3–7% of the population ask for advice or care.²

The treatment for TMD involves dental approaches, such as occlusal splints, occlusal adjustment, jaw exercises and counseling,³ but other options including low-level laser therapy have been used with good clinical results.^{1,2,4–16} Low-level laser therapy is a form of phototherapy that has been employed as a treatment for a variety of conditions, including musculoskeletal and soft tissue injuries and chronic ulceration.¹⁷ It is suggested to have biostimulating and analgesic effects through direct irradiation without causing a thermal response.²

Acupuncture is a therapeutic method based on traditional Chinese medicine, which consists of the insertion of small, solid needles that are usually made of stainless steel, into specific body points in order to improve health or modify painful states.³ It is considered to be capable of stimulating the organism's regulatory systems from the reflex responses obtained by means of afferent stimuli from specific points of the skin and muscles.^{3,18–20} Previous studies have demonstrated that acupuncture is useful as an adjunct or an alternative treatment for TMD.^{21,22}

Laser acupuncture is a treatment modality that uses light instead of needles to stimulate acupuncture points. It is promoted as being inherently safer than needle acupuncture because it is non-invasive and can be used for the stimulation of difficult points, such as auricular acupuncture points or points around the perineum or genitals.^{17,23} Little is known about the application of laser acupuncture for treatment of TMD patients.²⁴ In this case series study, we tested whether laser acupuncture was effective for the treatment of TMD.

Methods

Twenty patients with TMD were recruited from the Oral Medicine Clinic at the Oral Medicine Center, Chung Shan Medical University Hospital in Taichung, Taiwan, during the period from January 2011 to October 2011. All patients received panoramic and bilateral TMJ radiographies to exclude any bony abnormalities of the jaws. The inclusion

criterion for the patients was a diagnosis of TMD associated with muscle tenderness on palpation. Bilateral muscles including the masseter, pterygoid, temporalis and sternocleidomastoid muscles were palpated. Exclusion criteria were patients who had arthropathy of the TMJ, rheumatoid arthritis, recent trauma to the jaws, ongoing treatment of TMD, psychological illness, major systemic diseases (such as diabetes mellitus) and current pregnancy.

After informed consent was obtained, all patients were treated with a low-level energy diode laser with a wavelength of 800 nm. A straight hand-piece with a slightly curved tip whose end was 6 mm in diameter was used for delivering the laser light. The specific acupuncture points were selected according to their classical function on the basis of traditional Chinese medicine. Three standard ipsilateral local points (ST6, ST7 and one local Ashi tender point) and one contralateral distal point (LI4) were stimulated by the laser light in all patients. Traditionally, ST6 (Jiache, Fig. 1A), ST7 (Xiaguan, Fig. 1B) and the local Ashi point are used for relieving facial pain and LI4 (Hegu, Fig. 1C) is used for relieving pain of the face and neck.

When performing the laser acupuncture, the hand-piece tip was in direct contact with light pressure on the skin of the selected acupuncture points. The laser light output used was 1.5 W with 0.025 msec intermittent pulsing and a frequency of 20,000 Hz, which is equivalent to 0.75 W/cm². The laser light was applied for 134 sec to each selected acupuncture point, with an energy density of 100.5 J/cm² (0.75 W/cm² × 134 sec) for each point. A 10-cm visual analogue scale (VAS; zero for no pain and 10 for the most severe pain) was used to measure the pain intensity before and after the treatment. All patients were treated with the laser acupuncture once a week. The therapeutic course was ended when patients felt that they no longer required the treatment or demonstrated no symptom improvement after three courses of treatment. The VAS pain score at each visit was used for analysis. The duration of pain before initial treatment and the maximum mouth opening (MMO) before and after each treatment were recorded. We also conducted placebo laser acupuncture (i.e. the hand-piece tip was applied on the acupuncture points but no laser light was delivered) in six patients as controls.

The difference in VAS pain score before and after laser acupuncture treatment was assessed for statistical significance using the Wilcoxon signed rank test. The mean duration of pain in different patient groups was compared by Student's *t*-test. A *p*-value of less than 0.05 was considered statistically significant.

Results

Seventeen out of the 20 patients (85%) showed various degrees of pain relief after laser acupuncture treatment.

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