

Laser acupuncture in the energetic regulation of temporomandibular dysfunction: a randomized controlled trial

Laseracupuntura na regulação energética da disfunção temporomandibular: um ensaio clínico randomizado

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Abstract

The regulation of energy before clinical interventions can enhance therapeutic outcomes. While laser acupuncture has been shown as a complementary approach in dental care, no studies have assessed its potential to regulate energy in individuals with temporomandibular dysfunction (TMD). This study aimed to determine whether laser acupuncture promotes energetic regulation in patients with muscular-origin TMD. A blind, randomized clinical trial was conducted with 48 participants experiencing both energy imbalance and TMD-related pain. Subjects were distributed into four groups: acupuncture (A), laser (L), and their respective placebos, PA and PL. Group A received traditional acupuncture with needles; group L underwent low-level laser therapy; placebo groups had acupoints identified but without active stimulation. The Ryodoraku device, which evaluates 24 acupuncture points on the 12 meridians, was used to measure energy levels to detect regulation. Statistical analysis was performed using repeated-measures ANOVA, with significance set at $p < 0.05$. The acupuncture group (A) exhibited energy regulation (20.8%), and only the PA group did not show pain reduction ($p = 0.077$). The PL group experienced a decrease in energy ($p = 0.012$). Notably, the SP ($p = 0.008$) and BL ($p = 0.032$) meridians showed balanced energy in the A group. Although laser acupuncture did not result in overall energy regulation, it was effective in reducing TMD-related pain. These findings suggest that while laser acupuncture may not balance energy levels, it holds potential as a pre-treatment strategy for pain management in TMD patients.

Key-words: Lasers; Temporomandibular Joint Dysfunction Syndrome; Laser Therapy; Traditional Chinese Medicine; Acupuncture Therapy.

<http://dx.doi.org/10.5335/rfo.v30i1.17118>

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Introduction

The pathophysiology of the connection between TMD and energetic changes involves the Shao Yang (Sanjiao - Triple Heater) and Dan (Gall Bladder) meridians, affected by Perverse Energies such as Wind, Heat, and Damp-Heat, which lead to stagnation of Qi and Xue (blood) in Shao Yang (YSAO YAMAMURA, 2004 – Art of Insertion). Consequently, disorders like temporomandibular dysfunction arise from energy (Qi) blockages, requiring energy balance adjustments to restore proper Qi circulation.

Energy regulation seeks to harmonize energy levels across meridians, involving Yin energy (organs) and Yang energy (viscera). Thus, it can be indicated before clinical procedures to promote self-repair and rebalancing. Gil et al. demonstrated that energy regulation via acupuncture prior to impacted third molar extraction improved outcomes, reducing intraoperative bleeding and postoperative edema¹.

Acupuncture has proven effective in managing orofacial pain, showing a 40% reduction in symptoms and muscle relaxation². Another study confirmed pain reduction in TMD patients treated with acupuncture, highlighting it as a useful, low-cost method³. Other approaches for TMD management include self-care, psychological support, medication, physiotherapy, occlusal splints, muscle exercises, and manual therapy (SASSI et al., 2018).

Laser acupuncture, a method involving low-intensity, non-thermal laser stimulation of acupuncture points⁴, allows cells to absorb light energy based on wavelength, triggering therapeutic effects. As acupoints are rich in nerve tissue, they respond well to laser^{5,6}. Huang et al. (2014) reported that laser acupuncture is a viable, non-invasive treatment for TMD, offering pain relief without side effects. Hotta et al. (2010) added that it benefits needle-phobic patients and avoids infection risks.

This technique has shown positive results for various pain conditions, such as chronic low back pain⁷, fibromyalgia⁸, and in a systematic review of 18 studies (1998–2018), which found laser acupuncture generally effective⁹. Hu et al. (2014) also noted symptom improvement in treatment-resistant TMD.

In TMD patients, combining laser acupuncture with occlusal splints led to quicker symptom remission versus placebo laser and splint use¹⁰. It also reduced pain and improved mouth opening¹¹.

Although its benefits are documented, questions remain about whether results depend on local or distant point application. One study found pain improvement with both local and distant laserpuncture, compared to placebo¹². Another observational study with 29 refractory TMD patients confirmed symptom relief using two local points (ST6, ST7) and one distant point (LI4)¹³.

However, little is known about laser acupuncture's role in energy regulation before clinical or surgical procedures. Therefore, this study aims to evaluate whether laserpuncture effectively promotes energy balance in TMD patients.

Methodology and materials

Study design

This was a blind, randomized clinical study that was submitted for approval to the Research Ethics Committee (CEP) of the Piracicaba School of Dentistry. It was approved under protocol number CAAE: 48438021.1.0000.5418.

Participants

The study was carried out at the Primary Care Reference Center (PCRC) in the municipality of Piracicaba and patients who met the inclusion and exclusion criteria signed the Informed Consent Form.

Patients were selected according to the inclusion criteria: Adult patients of both genders, aged between 18 and 60, with pain due to temporomandibular dysfunction (TMD) of muscular origin and who had a pattern of energy imbalance. TMD was diagnosed using the DC/TMD criteria (Diagnostic Criteria for Temporomandibular Disorders)¹⁴. Exclusion criteria: Patients taking analgesic or anti-inflammatory medication; pregnant women, temporomandibular joint arthropathy, rheumatoid arthritis, recent trauma to the jaw and patients with energy levels within the normal range, which corresponds to between 40 and 60 μA , and without energy imbalance demonstrated in the Ryoduraku method (Perez, 2013).

Interventions

This was a blind, randomized clinical study with an estimated sample of 48 patients who were randomly assigned to four groups (Figure 1).

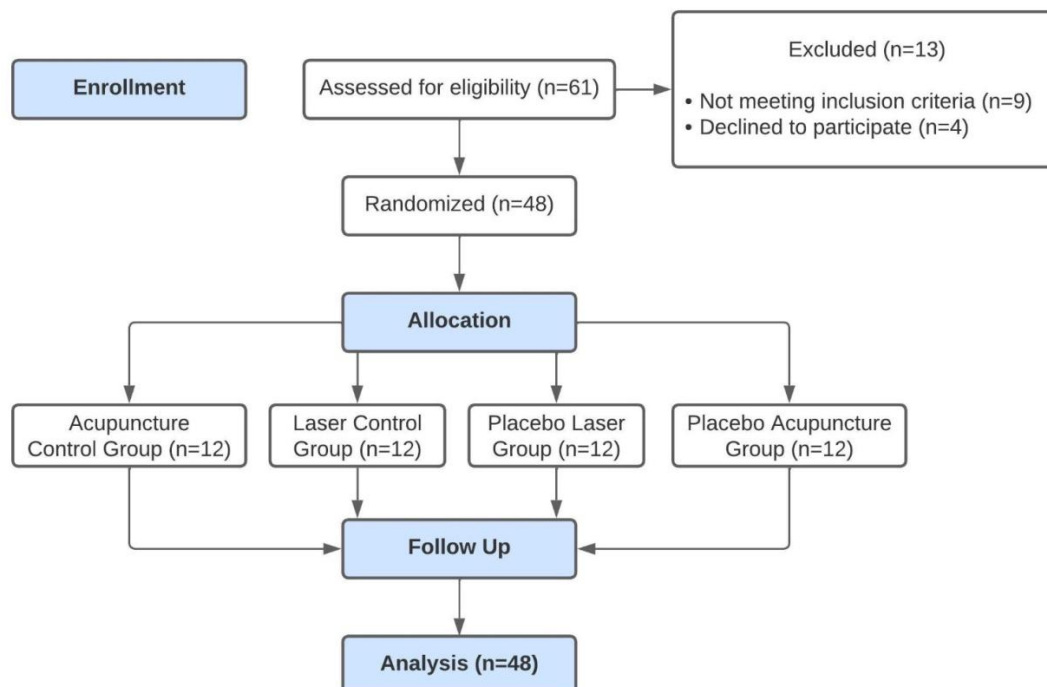


Figure 1: Flowchart of the distribution and exclusion of participants and their division according to groups. Acupuncture Group (A): regulation will be carried out with conventional needling; Laser Group (L): energy regulation will be carried out with the emission of laser light (laserpuncture); Laser Placebo Group (PL): laser light will be applied to acupoints that do not promote regulation; Acupuncture Placebo Group (PA): needling will be carried out on the same points as PL.

The energy imbalance was checked using the Ryoduraku device (RDK/NKL- Produtos Eletrônicos Ltda. Brusque - SC - Brazil/Lot 00218). The interpretation of the bioenergetic graph indicated which regulation protocol was used to promote regulation (Figure 2). The levels of great fullness; fullness; slight fullness; slight emptiness; emptiness and great emptiness are evaluated; the energy level considered to be within the normal range is between 40 and 60 μA^{15} . The following imbalances were thus established: 1. Simple Imbalance: 1.1 Laterality; 1.2 Energetic Unity (Slight Emptiness and Slight Fullness; Fullness and Emptiness; Great Fullness and Great Emptiness); 1.3 Movement regulation of those coupled by the Luo Yuan technique or vice versa. 2. Complex

imbalances: 2.1 Group Luo, seeking the balance of the multiple effects of a point using the group Luo; 2.2 Interdependent action, which enables interactions in the cycle of generation and control; 2.3 Progressive regulation, where there are cases of multiple changes, enabling global action. 3. general imbalance: 3.1 high and low imbalance; 3.2 general fullness and 3.3 general emptiness (Perez, 2013).

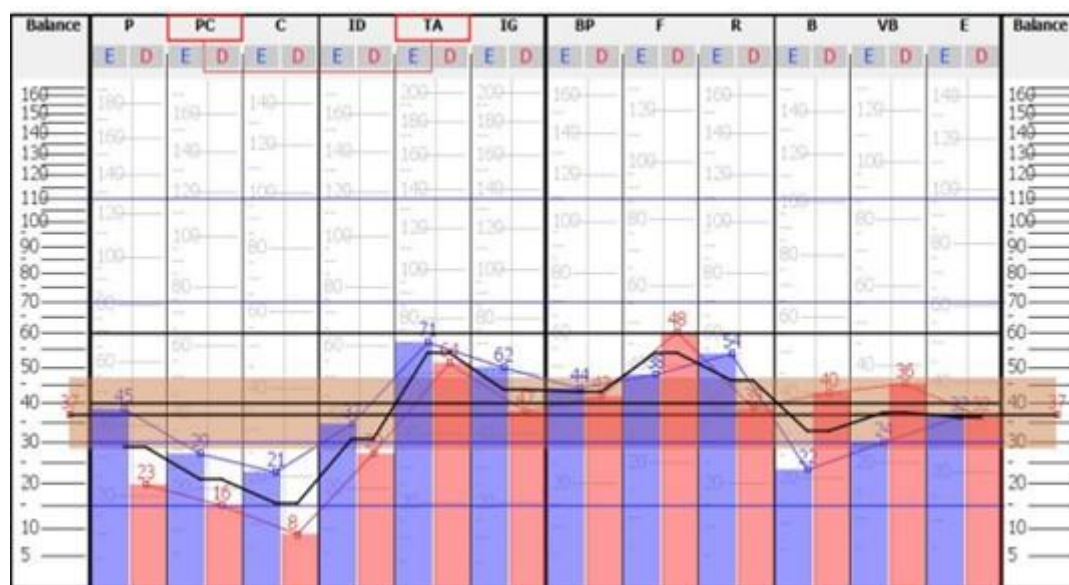


Figure 2: Bioenergetic graph of MFSPM patient, showing energy imbalance between PC (Pericardium meridian) and TE (Triple Energizer meridian).

Note: P=LU (Lung Meridian); PC (Pericardium Meridian); C=HT (Heart Meridian); ID= SI (Small Intestine Meridian); TA=TE (Triple Energizer Meridian); IG=LI (Large Intestine Meridian); BP=SP (Spleen Meridian); F=LR (Liver Meridian); R=KI (Kidney Meridian); B=BL (Bladder Meridian); VB=GB (Gallbladder Meridian); E=ST (Stomach Meridian).

Energy evaluation

The electrical conductance of 24 acupuncture points on the 12 meridians was measured with a device RDK/NKL. Of the 24 points, 12 are located on the wrists of the hands (right and left): Lung (L9), Pericardium (PC7), Heart (H7), Small Intestine (SI5), Triple Energizer (TE4), Large Intestine (LI5) and another 12 are located on the feet (right and left): Spleen-Pancreas (SP3), Liver (LR3), Kidney (K3), Bladder (B64), Gall bladder (GB40) and Stomach (St42)¹⁵. Almost all RRPM (Representative Ryodoraku Point of Measurement) are source points (yuan) where there is a high concentration of energy, except SI 5 and LI5 (King points)¹⁶. This device is a portable unit that

connects via USB to a personal computer. The device has two electrodes, which are responsible for picking up the current signal in the patient's circuit. One of the electrodes is a return pole, which the patient holds with her hand, and the other is a probe at the end of which a cotton tip can be placed. This tip should be moistened with water to be touched to the patient's skin so that there are fewer variations in the measurements. The pressure of the probe on the skin can vary from 60 to 150 grams. In this study, a pressure of 100 grams was set to be applied during the same time interval (0.75 seconds) and the probe was kept stationary over the point, using the traditional direct current technique (200 μ A maximum in a closed circuit)¹⁵. In this study, it was not a priority to assess the outcome pain, but it was also assessed on a scale of 0 to 10, where 0 was no pain and 10 was maximum pain.

Groups

In this study, it was recommended that up to two energy regulations be carried out. Thus, after 5 minutes of the first energy regulation and a new reading if there was no energy regulation, a new regulation was made. And after that, if there was no regulation, the patient's data would be counted as not having been regulated.

Acupuncture Group

The Acupuncture (A) group underwent conventional needling. The needles were inserted by a dentist specializing in acupuncture. After measuring the energy flow, a bioenergetic graph was produced, allowing the imbalance presented to be interpreted and the acupoints selected. For needling, 0.25x30mm disposable needles (DUX Acupuncture) were used and left in for 5 minutes after asepsis of the area with 70% alcohol. The depth of penetration of the needle was allowed to vary, taking into account the anatomical differences of the application sites and of each patient. Unilateral or bilateral needling was done according to the imbalance presented. After five minutes, the needles were removed and a new measurement was taken to check whether the previous imbalance had been re-established.

Laser Group

In the Laser (L) group, the laser was applied by a qualified professional following biosafety protocols. The low-power Therapy ACP laser (DMC Equipamentos Ltda, São Carlos, Brazil) with a spot diameter of 3.54 mm and an area of 0.09842 cm² was used for the application. With continuous light emission for 10 seconds, the energy delivered was 1 J with an energy density of 10.16 J/cm². The sequence of laser application to the acupoints was the same as that described for the A group. A dose of 2J infrared per acupuncture point was recommended, with an application time of 20 seconds.

For this application, both the patient and the operator were wearing protective goggles and the laser was properly wrapped in plastic to protect against cross-infection. The patient's skin was aseptically cleaned with 70% alcohol and the laser tip touched the volunteer's skin to reduce the scattering of the laser light. After the application was complete, a new energy flow reading was taken.

Placebo Laser Group

In the Placebo Laser (PL) group, the Yin meridian points LR7; LR8; SP5 and KI4 were used, bilaterally, which do not promote the balance of energy flow¹. The application sequence was the same as described in the previous groups and the dose was the same as in the L group. A new energy flow reading was taken at the end of the application.

Placebo Acupuncture Group

In the Placebo Acupuncture (PA) group, conventional needling was performed on the same acupoints as in the PL group, which do not promote energy flow balance. After inserting the needles bilaterally, they remained in place for 5 minutes. After the application, a new energy flow reading was taken.

Sample calculation

Based on the sample calculation carried out using G*Power 3.1.5 software (Universitat Dusseldorf, Dusseldorf, Germany), a total of 48 volunteers were to be selected and distributed into

four groups. For the sample calculation, the following were considered: sample power ($1-\beta = 0.80$), significance level ($\alpha = 0.05$), the percentage of occurrence observed in the base study. The analysis indicated a sample size of 11 participants for each group. In order to reduce the effects of possible losses, a margin of 10% was added ($n=12$).

Randomization and allocation

Allocation was carried out randomly as long as the patients met the inclusion criteria. Randomization was carried out by drawing lots before treatment. A 6-sided dice was used. The volunteer threw the dice and face number 1 corresponded to group A; face number 2 corresponded to group L; face number 3 corresponded to group PL; and face number 4 corresponded to group PA. The remaining faces (5 and 6) led to a new dice roll until the dice showed one of the faces corresponding to one of the groups described above. At the end of data collection, the patients were allocated to their groups by the researcher.

Blinding

In this study, only the patient was blinded to the group to which he belonged.

Statistical analysis

Analysis was carried out between and within groups. The repeated measures ANOVA test was used, followed by the Bonferroni adjustment test, with a significance level of 5%.

Results

A statistical analysis was carried out on 48 patients distributed equally between the 4 groups described above. Table 1 shows the characteristics of the patients according to the groups.

Table 1: Mean age, gender distribution, schooling, previous experience with acupuncture and low-power laser, type of TMD (%), initial VAS and initial general energy according to Ryodoraku (in mA) according to the groups. Piracicaba/SP, 2022.

Variables/Groups		A	L	PL	PA	p-value*
		(n=12)	(n=12)	(n=12)	(n=12)	
Age ($\bar{X} \pm SD$)		44.25 $\pm$ 14.72	41.92 $\pm$ 11.95	38.25 $\pm$ 13.44	42.67 $\pm$ 10.34	0.699
Gender, n (%)	Woman	12 (100%)	12 (100%)	11 (91.67%)	9 (75%)	0.088
	Man	0 (0%)	0 (0%)	1 (8.33%)	3 (25%)	
Education	Up to high school	75%	83.33%	58,33%	75%	0.671
	Higher education or higher	25%	16.66%	41,66%	25%	
Type of TMD (%)	Muscular	14.6%	22.9%	20.8%	20.8%	0.208
	Mixed	10.4%	2.1%	4.2%	4.2%	
Time of TMD pain ($\bar{X} \pm SD$)		57.56 $\pm$ 63.41	108.08 $\pm$ 125.15	40.58 $\pm$ 41.73	100.5 $\pm$ 60.39	0.120
Initial VAS		5.27 $\pm$ 2.54	6.62 $\pm$ 2.43	6.075 $\pm$ 2.87	4.31 $\pm$ 2.60	0.165
Initial EG		18.42 $\pm$ 11.70	15.33 $\pm$ 9.23	18.58 $\pm$ 13.13	13.67 $\pm$ 9.18	0.630

A=Acupuncture Group

L=Laser Group

* ANOVA followed by Bonferroni test

Table 1 shows that we started the groups with similar variables, i.e. all the groups had a higher percentage of women, an average age of around 40 years, education up to complete high school was

the predominant level of education and the most common type of TMD was muscular. The mean duration of pain was similar when comparing the groups. In the initial VAS, the lowest mean value was 4.31 and the highest 6.62. Initial General Energy was also similar between all the groups, with the lowest average among the 4 groups at 13.67 mA and the highest average among the groups at 18.58 mA.

Table 2 shows energy regulation according to the groups, showing that regulation was statistically significant only in the A group, reaching only 43.8% of energy regulation in the total group of volunteers.

Table 2: Energy regulation according to groups.

Groups/Regulation	No	Yes	p* value
A % (n)	4.2% (2) ^a	20.8% (10) ^b	
L % (n)	16.7% (8) ^a	8.3% (4) ^a	
PL % (n)	16.7% (8) ^a	8.3% (4) ^a	
PA % (n)	18.8% (9) ^a	6.3% (3) ^a	
Total (n)	27	21	0.015

* Pearson's chi-square test

When comparing the groups (Table 3), the A group ($p=0.000$) had a smaller reduction in pain than the PL group ($p = 0.043$); and the L group ($p= 0.005$), but had the same reduction in pain as the PA group ($p=0.509$).

Table 3: Means and ranges of the VAS scale according to the groups.

Groups/VAS	Initial VAS	VAS final	p* value
A	5.27 (3.74 – 6.79) ^{a,A}	1.42 (-0.38 – 2.87) ^{b,A}	0.000
L	6.62 (5.10 – 8.15) ^{a,A}	4.8 (3.38 – 6.29) ^{b,B}	0.005
PL	6.07 (4.55 – 7.60) ^{a,A}	4.82 (3.36 – 6.27) ^{b,B}	0.043
PA	4.30 (2.78 – 5.83) ^{a,A}	3.2 (1.76 – 4.67) ^{a,A}	0.077

*ANOVA of repeated measures.

Different lowercase letters in the row represent a significant difference $p < 0.05$.

Different capital letters in the column represent a significant difference $p < 0.05$.

Values presented as mean (range).

The only group that showed a statistically significant decrease in energy was the PL group ($p = 0.012$), but when comparing the groups this difference was not confirmed and all groups were similar, maintaining the initial energy (Table 4).

Table 4: Initial and final General Energy according to the groups.

Energy	Initial	Final	p* value
General			
A	18.417 ^{a,A}	15.917 ^{a,A}	0.180
L	15.333 ^{a,A}	13.250 ^{a,A}	0.262
PL	18.583 ^{a,A}	13.750 ^{b,A}	0.012

PA	13.667 ^{a,A}	14.417 ^{a,A}	0.684
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* Repeated measures ANOVA.

Different lowercase letters in the row represent a significant difference $p < 0.05$.

Different capital letters in the column represent a significant difference $p < 0.05$.

Table 5 shows that there was balance in 3 meridians, the Spleen-Pancreas and Bladder meridians in the A group and the Liver meridian in the LP (Table 5). When comparing groups, there was no statistically significant difference in any of the meridians.

Table 5: Difference in meridian energy laterality before and after the application of low-power laser light or acupuncture at the selected points, according to the groups, verified by Ryodoraku (in μA).

	A			L			PL			PA		
	Initial	Final	p-value	Initial	Final	p-value	Initial	Final	p-value	Initial	Final	p-value
Lung	9.583	5.750	0.230	5.917	7.833	0.546	9.583	6.833	0.387	9.167	5.417	0.240
Pericardium	6.000	5.000	0.662	5.250	5.500	0.913	7.833	6.333	0.513	6.833	6.083	0.743
Heart	7.000	3.250	0.234	5.417	3.167	0.473	9.000	6.417	0.411	5.167	6.500	0.670
Small Intestine	9.333	6.833	0.212	6.083	4.417	0.403	4.583	4.833	0.900	5.083	2.167	0.146
Triple Energizer	9.500	8.833	0.755	5.917	3.833	0.331	7.417	8.583	0.585	6.083	5.583	0.815
Large Intestine	13.667	10.667	0.247	7.833	8.000	0.948	8.333	7.667	0.796	6.083	5.750	0.897
Spleen	6.583	2.667	0.008	3.333	3.917	0.679	4.250	6.333	0.144	4.667	4.250	0.767
Liver	3.417	5.750	0.146	4.167	3.750	0.793	8.417	5.000	0.036	3.917	3.833	0.958
Kidney	8.917	7.250	0.572	4.250	6.917	0.368	14.083	13.167	0.756	4.250	9.583	0.076
Bladder	7.500	3.833	0.032	4.500	5.250	0.653	3.917	2.750	0.486	3.833	2.833	0.550

Gallbladder	7.167	5.583	0.302	4.417	4.750	0.827	5.917	5.000	0.549	4.667	3.500	0.446
Stomach	4.500	4.583	0.968	3.833	6.000	0.295	8.667	9.167	0.808	2.000	5.000	0.150

*ANOVA and post hoc Bonferroni adjustment

Discussion

In this study, the Laser group was not effective in achieving energy regulation when compared to the Acupuncture group, which was able to regulate, but there was a reduction in pain.

Laser acupuncture, which applies a low-power laser to acupuncture points in order to alter cellular metabolism through the effect of photobiostimulation, was evaluated. This can reduce pain through an analgesic effect by suppressing signal transmission along C fibers, or by releasing chemical mediators such as endorphins and enkephalins. It improves tissue healing processes (regeneration/repair), as it reduces the formation of scar tissue/fibrosis and reduces edema and accelerates the change in prevalence of the inflammatory process through the anti-inflammatory effect, as well as promoting vasodilation and activation of the lymphatic drainage system¹⁷.

Thus, there was a reduction in pain in the Laser, but not enough to match the pain reduction obtained by acupuncture, which was greater. This reduction in pain from acupuncture is confirmed in the literature in a study in which pain ceased in 67.7% of patients and there was a reduction in pain intensity when comparing the first session (6.10 ± 2.64) with the third session (1.16 ± 1.98), with 81% of pain reduced in total¹⁸, close to our study which reduced it by 73%. For the laserpuncture group, this reduction was 27.5%.

The use of low-power laser to stimulate acupuncture points to treat temporomandibular disorders has been used before. In a study¹¹ 13 women were selected aged between 33 and 40 with TMD. There was an increase in the mouth opening measurement after 12 sessions with laserpuncture, with weekly application and a decrease in VAS to less than half of the initial values, a greater difference than we obtained in our study.

The Placebo Laser group showed a reduction in pain and a reduction in energy. The Liver meridian was balanced in this group, as one of the acupoints used in the placebo protocol was point LR8, which although it does not provide energy balance, it is a tonification point. As most TMD patients have an energy void, for the point to act in toning, it first needed to expend energy in search of this action. In the Acupuncture group, the Spleen-Pancreas and Bladder meridians were also balanced. However, the comparison between the groups remained the same, i.e. energy regulation did not lead to a loss of energy. This has been verified in other acupuncture studies, which require energy expenditure when the primary objective is pain reduction^{19, 20}. Thus, we present an important finding, since energy regulation did not deplete energy and promoted pain reduction, which could be a protocol for pre-care of people in pain.

The literature points to protocols for the acupuncture approach for TMD patients²¹ in which the most prevalent balance patterns would be in the fire movements (related to the Heart, Pericardium, Small Intestine and Triple Heater meridians) and Liver and Spleen-Pancreas meridians, which corroborates the balance obtained in this study with the use of real acupuncture, in which the Spleen-Pancreas meridian obtained greater balance after therapy. On the other hand, the Placebo Laser group showed improved balance in the Liver meridian (the adjustment in the placebo group used points from the Liver meridian) and increased energy in the Kidney meridian in the Placebo Acupuncture group, confirming that there really was no energy expenditure in this meridian.

The use of lasers would be particularly suitable for those patients who are afraid of needles. Thus, studies should continue with this therapy, which has been shown to be effective in reducing pain in TMD patients. However, it was not as effective as acupuncture and energy regulation was not achieved.

We emphasize that even though we started with similar groups, energy regulation occurred in less than 50% of this sample and that future studies could take this finding into account when calculating the sample size.

With regard to energy regulation, the Acupuncture Control group also stands out for its higher percentage of regulation (20.8%) compared to the Laser Control group (8.3%), confirming data that was previously unpublished in the literature on the potential of acupuncture to promote energy regulation².

The possible limitations of this study are related to the calculation of the sample size, which for future studies could be calculated by type of energy imbalance and thus evaluate energy regulation within each pattern.

Although our hypothesis was refuted, that the laser could promote energy regulation, it should be noted that 50% of this group achieved regulation.

Conclusion

This study concluded that, although low-power laser therapy is not as effective at energy regulation as acupuncture, it has been shown to be effective at reducing pain in TMD patients.

Acknowledgments

This study was financed by the São Paulo Research Foundation (FAPESP) under Grant Process 2021/05103-9.

Resumo

A regulação energética antes de intervenções clínicas pode potencializar os desfechos terapêuticos. Embora a acupuntura a laser tenha sido demonstrada como uma abordagem complementar na odontologia, nenhum estudo avaliou seu potencial na regulação energética de indivíduos com disfunção temporomandibular (DTM). Este estudo teve como objetivo determinar se a acupuntura a laser promove regulação energética em pacientes com DTM de origem muscular. Foi realizado um ensaio clínico randomizado e cego, com 48 participantes que apresentavam desequilíbrio energético associado à dor relacionada à DTM. Os participantes foram distribuídos em quatro grupos: acupuntura (A), laser (L) e seus respectivos placebos, PA e PL. O grupo A recebeu acupuntura tradicional com agulhas; o grupo L foi submetido à terapia a laser de baixa intensidade; os grupos placebo tiveram os pontos de acupuntura identificados, mas sem estimulação ativa. Utilizou-se o dispositivo Ryodoraku, que avalia 24 pontos de acupuntura nos 12 meridianos, para mensuração dos níveis energéticos com o intuito de detectar a regulação. A análise estatística foi realizada por meio de ANOVA para medidas repetidas, com nível de significância estabelecido em $p < 0,05$. O grupo de acupuntura (A) apresentou regulação energética (20,8%), e apenas o grupo PA não demonstrou redução da dor ($p = 0,077$). O grupo PL apresentou diminuição dos níveis energéticos ($p = 0,012$). Destacaram-se os meridianos do Baço ($p = 0,008$) e da Bexiga ($p = 0,032$), que apresentaram energia equilibrada no grupo A. Embora a acupuntura a laser não tenha promovido regulação energética em geral, foi eficaz na redução da dor relacionada à DTM. Esses achados sugerem que, embora a acupuntura a laser possa não equilibrar os níveis energéticos, ela apresenta potencial como estratégia prévia ao tratamento para o controle da dor em pacientes com DTM.

Palavras-chave: Lasers; Síndrome da Disfunção da Articulação Temporomandibular; Terapia a Laser; Medicina Tradicional Chinesa; Terapia por Acupuntura.

References

1. Gil MLB, Marinho LMRF, de Moraes M, Wada RS, Groppo FC, Sato JE, et al. Effectiveness of Acupuncture in Dental Surgery: A Randomized, Crossover, Controlled Trial. *Journal of Acupuncture and Meridian Studies*. 2020 Jun;13(3):104–9. doi:10.1016/j.jams.2020.03.063
2. Gil MLB, Zotelli VLR, de Sousa M da LR. Acupuntura como alternativa para el tratamiento de la disfunción temporomandibular. *Revista Internacional de Acupuntura*. 2017 Jan;11(1):12–5.
3. Zotelli VLR, Meirelles MPMR, Sousa M da LR de. Uso da acupuntura no manejo da dor em pacientes com alterações na articulação temporomandibular (ATM). *Revista de Odontologia da Universidade Cidade de São Paulo* [Internet]. 2017 Dec 8 [cited 2021 Sep 27];22(2):185–8. Available from: <https://publicacoes.unid.edu.br/index.php/revistadaodontologia/article/view/415>
4. Whittaker P. Laser acupuncture: past, present, and future. *Lasers in Medical Science*. 2004 Sep 3;19(2):69–80.
5. Nunez Si, Ribeiro MS, Segundo A. *Laser de Baixa Potência: Princípios básicos e aplicações clínicas na odontologia* [Internet]. Elsevier Brasil; 2012. Available from: <https://books.google.com.br/books?id=Z4pGTy3Dt7sC>
6. Luiz Carlos Fornazieri. *Laser em Acupuntura - Teoria e prática*. Editora Roca LTDA São Paulo; 2011.
7. Zavarize SF, Diogo LC, Martelli A, Rosalino R. Efeitos do laser no tratamento da dor lombar crônica pela laserpuntura. *Revista Faculdades do Saber*. 2019 Dec 10;4(07).
8. Boggiss Érika Almeida. *Laseracupuntura pulsada aplicada nos acupontos do protocolo ryodoraku para intensidade da dor e variabilidade da frequência cardíaca na fibromialgia: ensaio clínico randomizado*. Unifal-mg edubr [Internet]. 2021 [cited 2023 Mar 3]; Available from: <https://bdtd.unifal-mg.edu.br:8443/handle/tede/1893>
9. De A, Santos, Santos, Fortuna PS, Gonçalves B, Abdalla PP, et al. Effect of laser acupuncture on humans: systematic review / Efeito da acupuntura a laser no ser humano: revisão sistemática. *Brazilian Journal of Development*. 2022 Jan 31;8(1):7945–57.
10. Ferreira LA, de Oliveira RG, Guimarães JP, Carvalho ACP, De Paula MVQ. Laser acupuncture in patients with temporomandibular dysfunction: a randomized controlled trial. *Lasers in Medical Science*. 2013 Feb 5;28(6):1549–58.
11. Castro KCMP de, Isoldi MC. Tratamento das disfunções temporomandibulares com estimulação por laser nos pontos de acupuntura. *Brazilian Journal of Development*. 2022 Aug 17;57552–67.
12. Madani A, Ahrari F, Fallahrastegar A, Daghestani N. A randomized clinical trial comparing the efficacy of low-level laser therapy (LLLT) and laser acupuncture therapy (LAT) in patients with temporomandibular disorders. *Lasers in Medical Science*. 2019 Aug 8;35(1):181–92.
13. Huang YF, Lin JC, Yang HW, Lee YH, Yu CH. Clinical effectiveness of laser acupuncture in the treatment of temporomandibular joint disorder. *Journal of the Formosan Medical Association*. 2014 Aug;113(8):535–9.
14. Paiva AMFV de, Melo LA de M, Almeida EO de, Paiva HJ de, Lima KC de. Construction and validation of a simplified questionnaire for screening of patients with temporomandibular disorder.

15. Perez ACN. *Las Biomediciones Según El Metodo Ryodoraku: El Diagnostico De Situación Y Su Tratamiento*. Ediciones C.E.M.E.T.C.S.L. Madrid, 2013.
16. Focks C, Ulrich März, Hosbach I. *Guia prático de acupuntura, localização de pontos e técnicas de punção*. Barueri, SP: Manole; 2018.
17. Camargo BAB de, Grillo CM, Sousa M da LR de. Temporomandibular disorder pain improvement with acupuncture: preliminary longitudinal descriptive study. *Revista Dor*. 2014;15(3).
18. Ferreira AL, Almeida TB de, Zotelli VLR, Roza RAL, Bello MIM, Sousa M da LR de. Biomediciones de los pacientes con odontalgia: método Ryodoraku. *Revista Internacional de Acupuntura*. 2020 Oct;14(4):125–31.
19. Zotelli VLR, Grillo CM, Gil MLB, Wada RS, Sato JE, da Luz Rosário de Sousa M. Acupuncture Effect on Pain, Mouth Opening Limitation and on the Energy Meridians in Patients with Temporomandibular Dysfunction: A Randomized Controlled Trial. *Journal of Acupuncture and Meridian Studies*. 2017 Oct;10(5):351–9.
20. Sousa M da LR de, Gil MLB, Montebelo MI de L. Temporomandibular dysfunction: energy patterns for acupuncture treatment. *Longhua Chinese Medicine* [Internet]. 2022 Jun 30 [cited 2022 Oct 3];5(0). Available from: <https://lcm.amegroups.com/article/view/8146/html>

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Recebido em: 05/06/2025. Aceito: 26/06/2025.