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# Comparison Of The Effectiveness Of Therapeutic Ultrasound And Laser Therapy In Individuals With Temporomandibular Joint Dysfunction

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**Abstract:** Temporomandibular joint dysfunction (TMD, TMJD) is an umbrella term covering pain and dysfunction of the muscles of mastication (the muscles that move the jaw) and the temporomandibular joints (the joints which connect the mandible to the skull). The most important feature is pain, followed by restricted mandibular movement, and noises from the temporomandibular joints (TMJ) during jaw movement. . The proposed study was designed to evaluate the effect of these modalities individually and compare the effect of two over one other. **Methodology** – The total duration of the study was 6 months. 42 subjects were selected between the age group of 25 -58 years. These subjects were divided into 2 groups (21 participants in each group). Group A was given therapeutic Ultrasound and massage. Group B was given Laser therapy and exercises. **Data analysis** – Data analysis was performed using statistical software. **Results-** This study indicates that therapeutic ultrasound is effective to treat TMD joint dysfunction and could substantially decrease pain and improve IID and jaw functions. Comparison of pre- and post-therapy VAS scores for both groups individually found statistically significant difference. However, the comparison of the post-therapy VAS score for pain between the two treatment groups showed a statistically significant difference favouring the Laser therapy group. Mouth opening was measured in both groups. Post-therapy mouth opening was greater in Group B than that in Group A. **Conclusion-** This study recommends Laser therapy for treating TMD-related pain with no underlying bony pathology.

Key words: Temporomandibular joint dysfunction , therapeutic ultrasound, laser

## TEMPOROMANDIBULAR JOINT DYSFUNCTION

Temporomandibular joint dysfunction is the second most frequent cause of oro-facial pain after dental pain (i.e. toothache). It is considered one of the 4 major symptom complexes in chronic oro-facial pain, along with burning mouth syndrome, atypical facial pain and atypical odontalgia. It is considered as a type of musculoskeletal, neuromuscular, or rheumatological disorder. It has also been called a functional pain syndrome, and a psychogenic disorder.

These patients can be treated by surgical and non-surgical approaches. Most commonly non-surgical treatments are occlusal splints of temporomandibular joints (TMJs) and the muscles of mastication, exercises, phototherapy, transcutaneous electrical nerve stimulation (TENS), ultrasound, dry needling, biofeedback therapy, pharmacotherapy and psychological treatment. Ultrasound mainly works as a mechanical vibration at frequencies above the limit of human sound detection, which can be transmitted into the body as high-frequency. Therapeutic ultrasound with an output between 20 to 60 kHz; produces deep heat at joints, decreases non-acute pain, muscle spasms, and inflammation of the tendon and facilitating the stretch of soft tissue by reducing the viscosity of collagen.

### AIM OF THE STUDY

- Analyze the efficacy of specific physiotherapeutic interventions, such as manual therapy, exercise, and modalities, on pain relief and functional improvement in patients with TMJ dysfunction.

### OBJECTIVES OF THE STUDY

- To evaluate the effect of therapeutic ultrasound on pain among the individuals with temporo-mandibular joint dysfunction.
- To evaluate the effect of therapeutic ultrasound on functional disability among the individuals with temporo-mandibular joint dysfunction.
- To evaluate the effect of laser therapy on pain among the individuals with temporo-mandibular joint dysfunction.
- To evaluate the effect of joint mobilisation on functional disability among the individuals with Temporo-mandibular joint dysfunction
- To compare the effect of therapeutic ultrasound and laser therapy on pain among the individuals with Temporo-mandibular joint dysfunction.

### METHODOLOGY

**Duration of study:** Total duration of study was 6 months

**Sample size:** A Minimum of 42 subjects was selected for the study, minimum of 21 subjects in each group.

**Sampling:** Simple Random Sampling

**Selection Criteria:** All the subjects were selected on the basis of following criteria.

**Inclusion Criteria:**

1. Age group between 25-45 years
2. Diagnosed with bilateral myofascial pain
3. Visual Analog scale (VAS)  $\geq 2$  for at least 3 months
4. With or without mouth opening limitation according to the Diagnostic Criteria
5. Signed informed consent.
6. Both males and females are selected
  - **Dependent Variables:** The patients were assessed for pain using Visual Analog scale (VAS) and the maximum pain-free inter-incisal distance (IID). In addition, mandibular movement (MM), jaw noise (JN), disability index (DI) and craniomandibular index (CMI) were also assessed.
  - **Independent Variables:**
    - Therapeutic ultrasound
    - Laser
    - Exercises: Jaw Relaxation, Resisted Mouth Opening and Chin tucks
    - Massage

Subjects with temporomandibular joint dysfunction, who visited the Shri Guru Ram Das Charitable Hospital were selected by simple random methods. Pain and function measure was taken at the beginning, at the first day of treatment (pre –treatment) and at 10th day end of treatment (post treatment).

<b>GROUP A (21 Subjects)</b>	<b>Therapeutic Ultrasound, Massage</b>
<b>GROUP B (21Subjects)</b>	<b>Laser and exercise</b>

**ANALYSIS**

- For within group analysis, paired T Test was used
- For between group analysis, Unpaired T Test was used.
- For gender analysis CHI Square test was used.

## RESULTS

- A total of 42 participants (21 in each group) completed the study. There were 22 women and 20 men aged 25–45 years (mean age  $37 \pm 2.13$  years).

**Table I: Demographics of participants**

Variable	Group A	Group B	p-value
Age (yr)	61.00±6.16	60.75±5.09	0.450
Height (m)	1.69±0.010	1.68±0.011	0.915
Sex			0.817
Male	11	10	
Female	9	10	
Weight (kg)	74.20±5.81	76.55±5.75	0.392
BMI (kg/m <sup>2</sup> )	25.99±1.95	27.10±2.90	0.288

**Table II. Comparison of VAS score for pain.**

	Pre-therapy	Post-therapy	Pre- vs Post-therapy comparison (Intragroup) t statistic (p-value)
Group A n = 21 (LLLT)	8.09 (1.37)	4.81 (2.01)	3.78 (P < 0.005)*
Group B n = 21 (Ultrasound)	7.47 (0.98)	6.19 (1.20)	6.17 (P < 0.001)*
A vs B (Intergroup comparison) t statistic (p-value)	1.68 (P > 0.05)	2.70 (P < 0.001)*	

\*Statistically significant

**Table III. Comparison of mouth opening.**

	Pre-therapy	Post therapy	Pre- vs Post-therapy comparison (Intragroup) t statistic (p-value)
Group A n = 21 (LLLT)	3.85 (0.44)	3.99 (0.40)	1.07 (P > 0.05)
Group B n = 21 (Ultrasound)	3.61 (0.44)	3.65 (0.41)	0.30 (P > 0.05)
A vs B (Intergroup comparison) t statistic (p-value)	1.76 (P > 0.05)	2.72 (P < 0.001)*	

\*Statistically significant

## DISCUSSION

Ultrasound therapy has been the treatment of choice to reduce pain and inflammation related to Temporomandibular joint dysfunction. The ultrasound prompts the degranulation of mast cells, which then release arachidonic acid. At an intensity of  $1.25 \text{ w/cm}^2$ , the sound waves cause tissue vibration, creating heat in the treatment field and an increase in blood flow to the tissues. The increase in blood flow delivers important nutrients and removes inflammatory exudates.

Comparison of pre- and post-therapy VAS scores for both groups individually found statistically significant difference. However, the comparison of the post-therapy VAS score for pain between the two treatment groups showed a statistically significant difference favouring the Laser therapy group. This proves that laser therapy is better for pain reduction than ultrasound therapy.

Mouth opening was measured in both groups. Post-therapy mouth opening was greater in Group B than that in Group A. The biochemical effect of the LASER light can stimulate the production of vascular endothelial growth factor and conversion of adenosine monophosphate into nitric oxide, which improves vessel growth. This suggests that LT is better for mouth opening than ultrasound therapy.

In conclusion, our study recommends Laser therapy for treating TMD-related pain with no underlying bony pathology.

## CONCLUSIONS:

This study indicates that therapeutic ultrasound is effective to treat TMD and could substantially decrease pain and improve IID and jaw functions. Laser treatment was effective in relieving pain in patients with TMD and had good efficacy in both myogenic and arthrogenic pathologies. Exercise therapy can be an effective option for managing orofacial pain and temporomandibular disorders (TMDs). In conclusion, our study recommends Laser therapy for treating TMD-related pain with no underlying bony pathology.

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## REFERENCES

1. McNeill C. Oral Surg Oral Med Oral Pathol Oral Radiol Endod . 1997;83:51. doi: 10.1016/s1079-2104(97)90091-3. [DOI] [PubMed] [Google Scholar]
2. McNeely ML, et al. Phys Ther . 2006;86:710. [PubMed] [Google Scholar]
3. Herb K, et al. Curr Pain Headache Rep . 2006;10:408. doi: 10.1007/s11916-006-0070-7. [DOI] [PubMed] [Google Scholar]
4. Fyfe M, et al. Aust J Physiother . 1985;31:6. doi: 10.1016/S0004-9514(14)60635-8. [DOI] [PubMed] [Google Scholar]
5. Ariji Y. Oral Surg Oral Med Oral Pathol Oral Radiol Endod . 2010;110:517. doi: 10.1016/j.tripleo.2010.05.003. [DOI] [PubMed] [Google Scholar]
6. Murphy MK, MacBarb RF, Wong ME, Athanasiou KA. Temporomandibular disorders: a review of etiology, clinical management, and tissue engineering strategies. Int J Oral Maxillofac Implants. 2013;28(6):393–414. doi: 10.11607/jomi.te20. [DOI] [PMC free article] [PubMed] [Google Scholar]
7. Ouanounou A, Goldberg M, Haas DA. Pharmacotherapy in Temporomandibular Disorders: A Review. J Can Dent Assoc. 2017;83:1–8. [PubMed] [Google Scholar]
3. Khairnar S, Bhate K, S N SK, Kshirsagar K, Jagtap B, Kakodkar P. Comparative evaluation of low-level laser therapy and ultrasound heat therapy in reducing temporomandibular joint disorder pain. J Dent Anesth Pain Med. 2017;19(5):289–294. doi: 10.17245/jdapm.2019.19.5.289. [DOI] [PMC free article] [PubMed] [Google Scholar]
9. Xu GZ, Jia J, Jin L, Li JH, Wang ZY, Cao DY. Low-Level Laser Therapy for Temporomandibular Disorders: A Systematic Review with Meta-Analysis. Pain Res Manag. 2018;4230583. doi: 10.1155/2018/4230583. [DOI] [PMC free article] [PubMed] [Google Scholar]
10. Shobha R, Narayanan VS, Jagadish Pai B S, Jaishankar H P, Jijin M J. Low-level laser therapy: A novel therapeutic approach to temporomandibular disorder – A randomized, double-blinded, placebo-controlled trial. Indian J Dent Res. 2017;28:380–387. doi: 10.4103/ijdr.IJDR\_345\_15. [DOI] [PubMed] [Google Scholar]
11. Quality and content of internet-based information on temporomandibular disorders. MW Park, JH Jo, JW Park - Journal of orofacial pain, 2012 - search.ebscohost.com
12. Morphological changes in temporomandibular joint architecture in patients with temporomandibular disorders: systematic review protocol S Kadkuzhi, V Karuveetil, RD Prabha, AV Velath... - BMJ open, 2024 - bmjopen.bmj.com