Efficacy of Low-Level Laser Therapy and Temporomandibular Joint Mobilization in subjects with Myo-facial Pain Syndrome

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Abstract

Background: Every age group is affected by myofascial pain syndrome (MPS), a regional pain illness that is typified by the presence of trigger points (TrPs) in the muscles or fascia. A distinct local and referred pain that is in line with the patient's presenting pain symptoms is produced when manual pressure is applied over an MPS. MPS can be treated with a variety of physiotherapy techniques. There are conflicting findings about the effectiveness of temporomandibular mobilization and low-level laser treatment (LLLT) in treating MPS, as evidenced by earlier research. For the treatment of MPS, there is also no comparison between LLLT and temporomandibular mobilization. The study sought to determine the effectiveness of temporomandibular joint mobilization and LLLT in treating MPS.
Results: Both methods are effective in reducing the degree of discomfort and increasing the maximum mouth opening in MPS patients.
Conclusion: TMJ joint mobilization, LLLT, and physical therapy therapies demonstrated notable clinical improvements in reducing discomfort and maximizing mouth opening in people with MPS.
Keywords: *Temporomandibular (TMJ) mobilization, low-level laser therapy (LLLT), and myofascial pain syndrome (MPS).*

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Introduction

Trigger points (TrPs) in muscles or fascia are a hallmark of myofascial pain syndrome (MPS), a regional pain disease that affects people of all ages. One of the most frequent cause of chronic regional pain in the region of temporomandibular joint is MPS, which is sometimes referred to as "muscle knots." Simon initially described MPS as a "combination of sensory, motor, and autonomic symptoms that are caused by Myo-facial trigger points". [1]

The patient's presenting pain symptoms are consistent with the unique local and referred pain that is produced when manual pressure is placed over an MPS region.[2] Although MPS is frequently combined with other pain syndromes, it differs from conditions like fibromyalgia in that it is localized, involves a taut band in skeletal muscle, and does not require numerous pain generators.

Although the precise prevalence of MPS in the general population is rarely mentioned in the literature. Currently literature demonstrates certain studies have suggested that MPS accounts for 30 to 85% of musculoskeletal pain in patients. Commonest age range of the condition is 27

to 50 years when this ailment most commonly affects people. Gender differences for the condition have not yet been identified. The pathophysiology of MPS is currently poorly understood; however, it is believed to be caused by muscle overload from either overuse or lack of exercise.

Traumatic events, ergonomic factors (such as poor or abnormal posture, overuse activities, etc.), structural factors (such as osteoarthritis, scoliosis, etc.), and systemic factors (such as hypothyroidism, vitamin D deficiency, and iron deficiency) are some of the risk factors that have been found to contribute to the development of MPS.[2]

Though MPS is very common, little is known about its pathophysiology. According to one theory, TrPs result from a malfunction of the neuromuscular junction and the connective tissue around it. Studies using electromyography have shown some indication of aberrant electrical activity at the motor endplates of neurons that terminate on TrP muscle fibers. Excessive acetylcholine (ACh) release was shown to be associated with excessive electrical activity, and both of these findings suggest potential pathways for the development of MPS and TrP activation.

Low Level Laser Therapy (LLLT) is considered as one of the conservative mode of therapy it has become more and more popular among the various physiotherapy techniques for treating MPDS. On irradiated tissues, LLLT has demonstrated analgesic, healing, and anti-inflammatory properties. Another method of treating MPS is mandibular mobilization. By theoretically exploiting reciprocal inhibition, this active-assistance strategy is used to improve mouth opening.[4]

Materials and Method

Forty MPS patients with restricted mouth opening were chosen from Nootan College of Physiotherapy's Orthopaedic Physiotherapy outpatient department. A painless, unsupported mandibular opening of <40 mm was considered limited mouth opening. Subjects who were treated for temporomandibular joint disorder in any way, including analgesics or antidepressants, were not allowed to participate in the study. The ethics committee of Sankalchand University's Nootan College of Physiotherapy gave its approval to the study. Before therapy began, each participant was informed about the study design and goal. Informed consent was obtained. Twenty patients each were randomly assigned to the LLLT and TMJ mobilization groups.

Prior to each treatment, the laser probe was cleaned with an alcohol swab and the laser was calibrated. The laser device used was gallium-aluminum-arsenide diode source (Doctor Smile Diode Laser, Italy). At 810 nm the instrument produced a continuous beam of 0.5 W peak power with a spot size of 5 mm. Light pressure was applied to the targeted muscle while the probe was held perpendicular during the procedure. To identify painful locations, the masticatory muscles were assessed bilaterally using forceful, continuous pressure. Patients in the laser group underwent 12 LLLT treatments (Table 1).

Table1: LLLT irradiation protocol

Day	1st week	2nd week	3rd week	4th week
Saturday	0.5W	0.2W	0.3W	0.1W
Sunday	0.4W			
Monday	0.3W	0.3W		
Tuesday	0.2W			
Wednesday	0.1W	0.4W	0.2W	0.2W

Two methods of TMJ mobilization treatment were administered to group 2. First, there was a passive method known as "long-axis distraction." The therapist uses this approach by placing the index or middle fingers beneath the patient's distal chin and the thumb on the patient's lower posterior

molars. The opposing hand stabilized the head. The therapist extracts the mandible along the long axis of the condyle by gently pressing inferiorly with the thumb and tapping the distal chin. This method should, in our opinion, be applied gently, held for about five seconds, and then repeated three to five times, or as necessary (Fig. 1).

Fig1: Mobilization technique for the long-axis distraction of temporomandibular joint.

The second method of mobilization was "overpressure with an opening." This technique utilizes the same hand placement and stabilization as used for long-axis distraction. The patient was instructed to open their mouth wide - as wide as they could. After that, the therapist applies light pressure on the molars. An "overpressure" with an opening results from this. It is performed three times while being held for roughly five to ten seconds. The therapy was administered four days a week.

Fig2: Low level LASER Therapy

Results

Every participant completed the procedure during the study period. Ten patients (25%) were male, while thirty patients (75%) were female. The participants in this study were 36±12.34 years old on average. (Table 2)

Table 2: Result of both groups from 1-4 weeks.

Mean	1st week	2ndweek	3rdweek	4thweek
Changes in Mean Subjective VAS in Groups in the Whole Treatment Phase	7.25±1.51	5.65±1.69	4.80±1.79	2.75±2.19
Changes in mean subjective Maximum Painless Mouth Opening During the Treatment	31.63±7.35	33.05±5.94	33.94±5.63	39.00±8.84

Discussion

Patients with MPD may benefit from LLLT and TMJ mobilization, a non-invasive, quick, safe, and non-pharmaceutical therapeutic approach. Therefore, the purpose of this study was to determine whether mouth opening and pain intensity might be improved in MPDS patients by using LLLT or TMJ mobilization.

According to the findings, both groups experienced a 95.86% decrease in pain, and the pain did not return during the follow-up period. The release of endogenous opioids, improvement of cellular respiration and tissue healing, vasodilation, increased pain threshold by altering the action potential of cell membranes, and reduction of inflammation. This was achieved by lowering Prostaglandin E2 and cyclooxygenase 2 levels which were some of the diverse mechanisms of action underlying the therapeutic and analgesic effects.[5] Carrasco et al. (780 nm, 50/60/70 J/cm²), da Cunha et al. (830 nm, 500 mW, 100 J/cm²),

and Emshoff et al. (632.8 nm, 30 mW, 1.5 J/cm²) observed a considerable reduction in discomfort. intensity in both the laser and placebo groups, indicating that the placebo effect of laser administration was primarily responsible for the improvement. In line with our study's findings, Marini et al. hypothesized that LLLT was more effective than ibuprofen at treating TMJ disorder-related pain and that all patients who got it experienced improvements in their mandibular function and pain severity.[6]

Maximum painless mouth opening was significantly improved in both groups in this study. Results show that both groups' mouth opening increased by 33.60% beginning with the first session. According to the literature, it indicates that LLLT demonstrates the functional improvement and that the patients' objective functional metrics happened later than the reduction in pain intensity.[7,8,9] TMJ mobilization procedures demonstrated that when the patient employs the agonists (lateral pterygoid, suprahyoid, and infrahyoid muscles) to voluntarily open their mouth wide, the motor neurons to the antagonists of jaw opening (masseter, temporalis, and medial pterygoid muscles) should be repressed. Muscle guarding should be reduced with the help of this technique. [6, 10]

Conclusion

TMJ joint mobilization and LLLT, two physical therapy procedures, were found to significantly enhance clinical outcomes in terms of pain reduction and maximum mouth opening in MPS patients.

Authors do not disclose and conflict of interest.

References

1. Urits I, Charipova K, Gress K, et al. Treatment and management of myofascial pain syndrome.*Best Pract ResClinAnaesthesiol*.2020;34(3):427-448. doi:10.1016/j.bpa.2020.08.003
2. Borg-Stein J, Iaccarino MA. Myofascial pain syndrome treatments. *Phys Med Rehabil Clin N Am*. 2014;25(2):357-374. doi:10.1016/j.pmr.2014.01.012
3. Kuć J, Szarejko KD, Gołębiewska M. Evaluation of Soft Tissue Mobilization in Patients with Temporomandibular Disorder-Myofascial Pain with Referral. *Int J Environ Res Public Health*. 2020;17(24):9576. doi:10.3390/ijerph17249576
4. Waide FL, Bade DM, Lovasko J, Montana J. Clinical management of a patient following temporomandibular joint arthroscopy. *Phys Ther*. 1992;72(5):355-364. doi:10.1093/ptj/72.5.355
5. Fatima J, Kaul R, Jain P, Saha S, Halder S, Sarkar S. Clinical Measurement of Maximum Mouth opening in Children of Kolkata and Its Relation with Different Facial Types. *J Clin Diagn Res*. 2016;10(8):ZC01-ZC5. doi:10.7860/JCDR/2016/21232.8217
6. Ayyildiz S, Emir F, Sahin C. Evaluation of Low-Level Laser Therapy in TMD Patients. *Case Rep Dent*. 2015:424213. doi:10.1155/2015/424213
7. Kuć J, Szarejko KD, Aleksandrowicz K, Gołębiewska M. The role of soft tissue mobilization in reducing orofacial and general complaints in a patient with Kimmerle anomaly and temporomandibular joint disorder: A case report. *Cranio*. 2021;39(1):74-87. doi:10.1080/08869634.2018.1560616
8. Borg-Stein J, Iaccarino MA. Myofascialpain syndrome treatments. *Phys Med Rehabil Clin N Am*. 2014;25(2):357-374. doi:10.1016/j.pmr.2014.01.012
9. Mortazavi H, Javadzadeh A, Delavarian Z, Zare Mahmoodabadi R. Myofascial Pain Dysfunction Syndrome (MPDS). *Iranian Journal of Otorhinolaryngology* 2010;*22*(4):131-136. doi: 10.22038/ijorl.2010.368.

10. Osiewicz M, Manfredini D, Biesiada G, et al. Prevalence of Function-Dependent Temporomandibular Joint and Masticatory Muscle Pain, and Predictors of Temporomandibular Disorders among Patients with Lyme Disease.*J Clin Med*. 2019;8(7):929. doi:10.3390/jcm8070929.

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