

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

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Abstract

Background: Myo-facial Pain Syndrome (MPS) is a regional pain disorder that affects every age-group and is characterized by the presence of trigger points (TrPs) within muscles or fascia. When manual pressure is applied over an MPS, it produces a distinct local and referred pain that is consistent with the patient's presenting pain symptoms. There are various physiotherapy treatments available for MPS.

Objectives: As such there are controversial results regarding the therapeutic efficacy of Low-level laser therapy (LLLT) and Temporo-mandibular mobilisation in the management of MPS which has been demonstrated by previous studies. Additionally, there is no comparison between LLLT and Temporo-mandibular mobilisation for the treatment of MPS. The aim of the study was to find out the Efficacy of LLLT and Temporo-mandibular Joint Mobilization for the treatment of MPS.

Results: We found that both the techniques are useful to decrease pain intensity and improvement in maximum mouth opening in subjects with MPS.

Conclusion: Physical therapy interventions, TMJ joint mobilization and LLLT showed significant clinical improvement in reduction of pain and maximal mouth opening of the individuals with MPS. There was no statistical difference seen between the treatment modalities.

Keywords: Myo-facial pain syndrome (MPS), low level laser therapy (LLLT), Temporo-mandibular (TMJ) mobilization.

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Introduction

Myo-facial Pain Syndrome (MPS) is a regional pain disorder that affects every age group and is characterized by the presence of trigger points (TrPs) within muscles or fascia.¹ Commonly recognized as “muscle knots,” MPS is the most common cause of persistent regional pain. Simon's original definition of MPS is defined as a “complex of sensory, motor, and autonomic

symptoms that are caused by Myo-facial trigger points”.¹

When manual pressure is applied over an MPS, it produces a distinct local and referred pain that is consistent with the patient's presenting pain symptoms.² MPS is often grouped with other pain syndromes; however, it is distinct from

diagnoses such as fibromyalgia in that it is focal, does not require multiple pain generators, and involves a taut band in skeletal muscle.

The exact prevalence of MPS in the general population is infrequently cited in existing literature, some studies have estimated that MPS comprises 30 - 85% of cases of musculoskeletal pain.¹ The people most affected by this condition are between the ages of 27- 50 years.¹ Any difference between genders has not yet been determined. Although the patho-physiology of MPS is still not well understood, it is thought to be due to muscle overload as a result of either overuse or disuse.¹

There have been several risk factors identified that contribute to the development of MPS which include traumatic events, ergonomic factors (e.g., poor/ abnormal posture, overuse activities, etc.), structural factors (e.g., osteoarthritis, scoliosis, etc.) and systemic factors such as hypothyroidism, vitamin D deficiency, and iron deficiency.²

Despite the prevalence of MPS, its patho-physiology remains incompletely understood. One hypothesis suggested that TrPs are due to a dysfunction of the neuromuscular junction and surrounding connective tissue. Electromyography studies have revealed some evidence of abnormal electrical activity at the motor endplates of neurons terminating on muscle fibers of a TrP. Excessive electrical activity was identified as excess acetylcholine (ACh) release,³ both of which propose possible mechanisms for the formation of TrPs and the development of MPS.

Among different physiotherapeutic methods for the treatment of MPDS, LLLT has gained popularity due to its conservativeness. LLLT has shown analgesic, healing, and anti-inflammatory effects on irradiated tissues. Temporo-

mandibular mobilization is an additional treatment modality for MPS. This active-assistive technique is performed in order to increase opening by theoretically taking advantage of reciprocal inhibition.⁴

Materials and Method

Forty MPS patients with limited mouth opening were selected from the Orthopedic Physiotherapy OPD of Nootan College of Physiotherapy. Limited mouth opening was defined as pain-free unassisted mandibular opening of <40 mm.⁷ Subjects who received analgesic or antidepressant medicine or underwent any other form of treatment for Temporo-mandibular joint disorder were excluded from the study. The study was approved by the ethics committee of Nootan College of Physiotherapy, Sankalchand University. The purpose of the study was described to each participant and an informed consent was obtained prior to the start of treatment. The cases were randomly divided into LLLT and TMJ mobilisation groups with 20 patients in each group.

Laser calibration was done before use and the laser probe was disinfected with an alcohol swab before each treatment. The laser device was a gallium-aluminum-arsenide diode source (Doctor Smile Diode Laser, Italy) with a wavelength of 810 nm and a continuous 0.5 W peak power output beam with 5 mm spot size. The probe was held perpendicular with a light pressure on the targeted muscle. The masticatory muscles were evaluated bilaterally with firm and constant pressure to define painful areas. Laser group patients received 12 sessions of LLLT (Table 1).

Table 1: LLLT irradiation protocol

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

For group 2 TMJ mobilization treatment were given in two techniques. The first is a passive technique called "long-axis distraction." In this technique, the therapist places his or her thumb on the patient's lower posterior molars and the index or middle fingers under the distal chin. The head is stabilized by the chest and opposite hand. By gently pressing inferiorly with the thumb and stabilizing the distal chin, the therapist can distract the mandible along the long axis of the condyle. We believe this technique should be administered gently and held for approximately 5 seconds, then repeated three to five times or as needed (Fig 1).



Fig 1: Mobilization technique for the long-axis distraction of temporomandibular joint.



Fig 2 Low level LASER Therapy

The second mobilization technique was "overpressure with an opening." This technique involves the same hand placement and stabilization as used for long-axis distraction. The patient was asked to open mouth as wide as possible. The therapist then gently presses down on the molars. This produces an "overpressure" with an opening. It is held for about 5 to 10 seconds and repeated three times. The treatment was given for 5 days/week for 4

weeks. Pre and post treatment maximum mouth opening and pain scale were recorded.

Results

All participants completed the study period. Thirty patients (75%) were female and 10 (25%) were male. In this study, the mean age of subjects was 36 ± 12.34 . (Table 2)

Discussion

LLLT and TMJ mobilisation is a non-invasive, rapid, safe and non-pharmaceutical treatment method that may be beneficial for patients with MPD. Thus the aim of this study was to evaluate whether LLLT or TMJ mobilisation could reduce pain intensity and improve mouth opening in patients with MPDS.

As per the results, 95.86% pain reduction occurred in both group, while the pain did not recur in the follow-up period. The mechanisms of action behind the therapeutic and analgesic effects are variable and include the release of endogenous opioids, enhancement of cellular respiration and tissue healing, vasodilation, increased pain threshold by changing the action potential of cell membranes, and decreasing inflammation by reducing prostaglandin E2 and cyclooxygenase 2 level.⁵ Emshoff et al (632.8 nm, 30 mW, 1.5 J/cm²), Carrasco et al (780 nm, 50/60/70 J/cm²) and da Cunha et al (830 nm, 500 Mw, 100 J/cm²), who reported a significant reduction of pain intensity in both laser and placebo groups, suggesting that improvement was mostly due to the placebo effect of laser administration. Similar to the results of our study Marini et al also postulated that pain severity and mandibular function improved in all patients who received LLLT and it has been more efficient in the treatment of pain caused by TMJ disorder compared to ibuprofen.⁶

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

Mean	1 st week	2 nd week	3 rd week	4 th week
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

In this research a significant improvement was observed in maximum painless mouth opening in both group. Results demonstrate 33.60% increase in mouth opening in both group which started from the first session. It means that LLLT shows the functional improvement and the objective functional parameters for the patients occurred later than the decrease in pain intensity which coordinates with literature.^{7,8,9} TMJ mobilization techniques showed that the motor neurons to the antagonists to jaw opening (masseter, temporalis, and medial pterygoid muscles) should be inhibited as the patient uses the agonists (lateral pterygoid, suprahyoid, and infrahyoid muscles) to volitionally open the mouth wide. This technique should facilitate a decrease in muscle guarding.^{6,10}

Conclusion

This study concluded that both physical therapy interventions i.e. TMJ joint mobilization and LLLT showed significant clinical improvement in reduction of pain and Maximal mouth opening of the individuals affected by MPS.

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