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RESEARCH ARTICLE

EFFECTS OF LOW LEVEL LASER IN THE TREATMENT OF MYOFASCIAL PAIN DYSFUNCTION TEMPOROMANDIBULAR JOINT IN SAMPLE OF YEMENI PATIENT

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Abstract

Background and aims: Temporomandibular disorders (TMDs) are a collection of ailments that impact the temporomandibular joints and tissues, especially while chewing. The most prevalent type of TMD that causes discomfort and functional challenges is masticatory myofascial pain (MMP). Treatments for MPDS vary, with conservative and reversible therapies including behaviour adaptation, physical therapy, medicine, oral devices and patient education. The aim of this study is to test low-level laser therapy (LLLT) in reducing pain, increasing function, and improving range of motion and ability to perform daily activities in patients with MPS.

Patients and Methods: This study was a prospective clinical trial designed twenty patients to assess the efficacy of LLLT as a treatment modality for MPS, including the incidence and severity of side effects.

Results: The mean pain severity, measured using the Visual Analog Scale (VAS), significantly decreased from 7.5 (1.3 SD) in first Week and progressively reducing to 3.8 (1.0 SD) in six Week, indicating substantial pain reduction over the treatment period. The majority of patients showed significant improvement, with 95% of participants experiencing a reduction in pain severity (p<0.001).

Conclusions: This study elucidated that LLLT may be regarded as an appropriate and non-invasive therapeutic approach for MPD. It was also effective, had promising outcomes, and can be utilized as a treatment for MP. Low-Level Laser Therapy (LLLT) is regarded as a preferred therapeutic option due to its short-term bio stimulatory, analgesic, anti-inflammatory, and regenerative benefits. LLLT shown minimal adverse effects and exhibited favorable patient acceptability.

Keywords: Low-Level Laser Therapy (LLLT), Masticatory Myofascial Pain (MMP), Temporomandibular disorders (TMDs), Yemen.

INTRODUCTION

Masticatory myofascial pain (MMP) is the most prevalent temporomandibular disorder (TMD) that results in discomfort and functional challenges. Temporomandibular disorders (TMDs) are a set of illnesses that affect the temporomandibular joints and related tissues, especially during mastication. Internal derangement of the joint includes a displaced disc, a dislocated jaw, or a condylar injury, along with arthritis[1]. Several studies talk about temporomandibular disorders (TMDs) being most common, affecting females more than males between the ages of 20 and 40[2]. Although the etiology of temporomandibular disorders is still controversial, oral and facial macro-trauma, parafunctional habits (such as bruxism), positional changes of the teeth and hormonal fluctuations have been proposed as contributing factors[2].

The main cause of facial pain is myofascial pain dysfunction syndrome (MPDS), which is marked by local discomfort, masticatory and associated muscle dysfunction, and muscle rigidity. People with MPDS say they have trouble moving their jaw, headaches, otalgia, temporomandibular joint (TMJ) crepitus when they open their mouth, and pain in their masticatory muscles[3]. The main sign of temporomandibular disorders (TMDs) is the trigger point; the pain can originate from myofascial structures or distant areas. Myofascial trigger points (MTrPs) are a common source of pain in clinical settings and musculoskeletal problems, but they are not always present. Reduced range of motion, lower muscular strength, and changes in functionality and quality of life all correlate with myofascial pain and trigger points[3,4]. Because the causes of myofascial pain dysfunction (MPD) are so complicated, the treatments for this condition are also very different. First, managing of MPDS advises conservative and reversible therapies, including behavior alteration, physical therapy, medicine, oral devices, patient education, and therapeutic techniques used are thermal therapy, acupuncture, electrical stimulation, ultrasonic therapy, physiotherapy, and low-level laser therapy (LLLT). A clear gold standard treatment for myofascial pain was elusive; about 75% of people with temporomandibular disorders (TMD) have long-lasting symptoms. If myofascial pain syndrome (MPS) is not found or treated properly, it can lead to chronic complex pain[5,6].

Low-level laser therapy (LLLT) is thought to be an extra way to treat temporomandibular disorders (TMD) because it can relieve pain, reduce inflammation, and help cells grow. Low-Level Laser Therapy (LLLT) lowers pain by controlling neurotransmitters like endorphins and serotonin. This process, also known as photobiomodulation, also stops inflammation and pain. It lowers inflammation by making mitochondria more active[7]. This allows nerve damage repair, angio-genesis, vasodilation, and the release of endogenous endorphins, all of which help repair tissues. Low-energy laser (LEL) technology is used in modern dentistry to help tissues heal faster, lessen pain, and lower inflammation in the orofacial region, whether over nerves or joints. LLLT effectiveness depends on wavelength, treatment period, dosage, and the application site[8]. The LLLT raises the pain thresholds in sensory nerve terminals and speeds up metabolism by increasing electrolyte exchange in cell protoplasm. Low-level laser therapy (LLLT) lowers the production of cyclooxygenase 2 and stops arachidonic acid from changing into prostaglandins E2 and F2 and thromboxane, however, it is still not clear how lasers exactly relieve pain. Although the success of LLLT in satisfying these requirements calls for further research, the ideal therapy for MPDS should be quick, reasonably priced, and sustainable[9].

In Yemen, temporomandibular joint disorders (TMJ) are a major problem. Several recent studies have discussed the problem of TMJ, including TMJ dystonia: prevalence, clinical and demographic data, and outcomes of therapeutic strategies for hundreds of patients[10], prevalence of TMJ signs in healthy, completely edentulous individuals without symptoms, the effect of dentures on TMJ[11], levels of interleukin-1 beta in the human gingival sulcus: rates and factors affecting its levels in healthy individuals, including association with TMJ[12], the effect of intermaxillary fixation on TMJ, biochemical and hematological markers in adults[13], three-dimensional assessment of the shape of the first cervical vertebra in Class I and III skeletal malocclusion[14], the validity of the Ponnet analysis in a Yemeni population[15], and evaluation of the anatomical structure of the anterior maxillary sinus canal to avoid surgical complications, including damage to the TMJ[16]. Therefore, the aims of the current study were to evaluate the effect of low-level laser therapy (LLLT) on the severity of myofascial pain and associated symptoms, to assess the safety and tolerability of LLLT as a treatment modality for MPS, including the incidence and severity of side effects; and to investigate the potential predisposing factors that may influence the response to LLLT in treatment MPS.

MATERIALS AND METHODS

Study Design: The purpose of this prospective clinical experiment is to assess how well low-level laser treatment works for treating myofascial pain syndrome.

Study Population: This study was included twenty patients who had diagnosis myofascial pain Dysfunction

Inclusion Criteria:

- Adults aged 18-55 years.
- Diagnosed with MPDS based on Helkimo's index (Helkimo, 1974).
- Presence of active trigger points in the masticatory muscles.
- Chronic pain lasting longer than 3 months.

Exclusion Criteria:

- Systemic disorders like rheumatoid arthritis or fibromyalgia.
- Pregnancy or lactation.
- Recent TMJ surgery or facial trauma. - Use of TMJ-related therapies in the past 3 months.

Patient Recruitment: Patients were recruited through the outpatient clinic of Sana'a University. After confirming eligibility based on inclusion/exclusion criteria, patients were informed about the study objectives and procedures. Written informed consent was obtained before enrollment.

Baseline Assessment

Demographic Data: Gender, age, medical history, and social habits (e.g., qat chewing) were recorded.

Pain Assessment: Visual Analog Scale (VAS): Patients rated their pain on a scale of 0 (no pain) to 10 (worst pain imaginable) were measured. Also, frequency and Duration of Pain Episodes were documented using a patient diary.

Functional Assessment: Maximum Mouth Opening (MMO) was measured using a Vernier caliper to assess interincisal distance.

Identifying trigger points: By manual palpation of the masseter, temporalis, medial pterygoid and lateral pterygoid muscles were done to identify active trigger points.

Laser Therapy Procedure

Preparation

Patient Positioning: Patients were seated in a semi-reclined position in a dental chair, the treatment area was disinfected with chlorhexidine and both the operator and patient wore laser safety goggles.

Laser Application:

Device Settings: Wavelength: 635 nm, Energy Density: 10 J/cm².

Application Time: 8 minutes per trigger point.

Application Technique: The laser device was positioned perpendicular to the skin overlying each trigger point.

The following muscles were targeted:

Masseter: One point on the superficial layer. **Temporalis:** One point on the anterior muscle bundle.

Post-Treatment Assessments

Pain Relief: VAS scores were compared pre- and post-treatment at 1 and 3 months. **Functional Improvement**: Changes in MMO were recorded to assess jaw mobility.

Quality of Life: Sleep quality, stress levels, and daily activity disruption were evaluated using self-reported questionnaires.

Data Collection: Data were recorded in structured sheets for each patient. Pre and follow-up data were used to assess changes within group.

Statistical Analysis: Software: SPSS (Version 30.0.0) was used for analysis data. For descriptive Statistics was done to summarize demographics and baseline characteristics. Aired t-tests was used to compare pre- and post-treatment outcomes (e.g., VAS, MMO). For Significance level *p*-value <0.05 was considered statistically significant.

Ethical Considerations: An ethical approval was received from the medical ethical committee of the Faculty of Dentistry, at Sana'a University, and all participating patients signed informed consent at the beginning of the study.

RESULTS

The participant patients' demographics and baseline attributes: A thorough summary of the research participants' demographics and baseline characteristics is given in Table 1. Of the 20 participants, 30% (n=6) were male and 70% (n=14) were female, with a mean age of 30.5±5.2 years, indicating a relatively broad age range from 18 to 55 years. A quarter of the participants (25%, n=5) reported having chronic illnesses, while the remaining 75% (n=15) were free from such conditions. Thirty-five percent (n=7) had a history of head or neck injuries, which could potentially influence the study outcomes related to pain or muscle tension. Additionally, 40% (n=8) of participants had a history of dental issues, which might be relevant given the potential link between dental health and jaw pain. Musculoskeletal disorders were reported by 15% (n=3) of participants, and 30% (n=6) were using medications that could affect pain perception or symptom management.

Table 1: Patient demographics and baseline assessment of MPS patients who underwent low-level laser therapy (LLLT) to reduce pain, increase function, and improve range of motion and ability of the temporomandibular joint.

Variable	n
Gender	
Male	6 (30)
Female	14 (70)
Age range (years)	20–40 years
Mean age	30.5±5.2 years
Chronic illness (yes/no)	5/15 (25/75)
Previous head/neck injuries	7 (35)
History of dental issues	8 (40)
Musculoskeletal disorders	3 (15)
Medication use	6 (30)
Stress or anxiety (yes)	12 (60)
Qat chewers	17 (85)

A significant proportion (60%, n=12) reported experiencing stress or anxiety, which are known to exacerbate muscle tension and pain. Finally, 85% (n=17) of the participants were regular Qat chewers, a lifestyle factor that may contribute to temporo-mandibular dysfunction or increase the likelihood of jaw pain. These baseline characteristics offer valuable context for understanding the participants' pain experiences and highlight factors that could influence the study's outcomes.

The characteristics of myofascial pain: The characteristics of myofascial pain experienced by the study participants are detailed in table 2. The mean pain scores, using the Visual Analog Scale (VAS), was 7.5 (±1.3 SD), with scores ranging from 5 to 9, indicating that most participants experienced moderate to severe pain. The average duration of pain was 6.2 months (±3.1 SD), with a range of 1 to 12 months, reflecting a variable chronicity of symptoms among patients. Participants reported an average of 4.3 pain episodes per day (±1.5 SD), with a frequency range of 2 to 7 episodes per day.

Table 2: Characteristics of myofascial pain in MPS patients who underwent low-level laser therapy (LLLT) for pain reduction.

Parameter	Mean±SD	Range (Min-Max)
Pain Severity (VAS Scale)	7.5±1.3	5–9
Pain Duration (Months)	6.2±3.1	1–12
Frequency of Pain Episodes	4.3±1.5/day	2–7/day
Common Pain Triggers	Chewing (90%)	Talking (75%)
Common Pain Relievers	Rest (85%)	Medication (40%)

Table 3: Weekly pain intensity and treatment progression in MPS patients who underwent low-level laser therapy (LLLT) for pain reduction.

Week	Pain Severity (VAS)	Duration of Pain Episodes (Minutes)	Frequency of Pain Episodes	Laser Dosage (J/cm²)	Wavelength (nm)	Application Duration (Minutes)	Application Sites	Remarks
1	7.5±1.3	45±12	4.3±1.5	10	635	8	Masseter, Temporalis	Mild relief
2	6.8±1.1	38±10	4.0±1.4	10	635	8	Masseter, Temporalis	Moderate relief
3	6.2±1.0	32±8	3.5±1.2	10	635	8	Masseter, Temporalis	–
4	5.5±1.2	28±6	3.0±1.0	10	635	8	Masseter, Temporalis	–
5	4.5±1.1	20±5	2.5±0.8	10	635	8	Masseter, Temporalis	Significant relief
6	3.8±1.0	15±4	2.0±0.5	10	635	8	Masseter, Temporalis	Pain minimal

Table 1: Side effects monitoring in MPS patients who underwent low-level laser therapy (LLLT).

Week	Skin Irritation (Yes/No)	Headache (Yes/No)	Dizziness (Yes/No)	Fatigue (Yes/No)	Other Side Effects (Specify)
1	No	Yes	No	Yes	Mild jaw stiffness
2	No	No	No	Yes	–
3	No	No	No	No	–
4	No	No	No	No	–
5	No	No	No	No	–
6	No	No	No	No	–

Chewing was identified as the most common trigger for pain, reported by 90% of participants, followed by talking, which was a trigger for 75% of the sample. Rest was the most commonly reported pain reliever, alleviating discomfort in 85% of cases, while 40% of participants found relief through medication. These findings highlight the significant impact of myofascial pain on daily activities and the reliance on non-pharmacological and pharmacological methods for pain management.

Progression of pain severity and treatment outcomes over six weeks: The progression of pain severity and treatment outcomes over six weeks is summarized in Table 3. Weekly pain severity, measured using the Visual Analog Scale (VAS), showed a consistent decline, starting at 7.5 (±1.3 SD) in Week 1 and progressively reducing to 3.8 (±1.0 SD) by Week 6, indicating substantial pain reduction over the treatment period. The average duration of pain episodes decreased from 45 minutes (±12 SD) in Week 1 to 15 minutes (±4 SD) in Week 6, reflecting a significant reduction in episode length. Similarly, the frequency of pain episodes per day reduced from an average of 4.3 (±1.5 SD) in Week 1 to 2.0 (±0.5 SD) by Week 6. A consistent laser dosage of 10 J/cm² was applied throughout the treatment, using a 635 nm wavelength for eight minutes per session, targeting the masseter and temporalis muscles. The treatment was associated with incremental improvements: mild relief was observed by Week 1, moderate relief by Week 2, and significant relief by Week 5, with pain becoming minimal by Week 6. These results demonstrate the efficacy of the laser treatment in reducing pain severity, episode duration, and frequency, leading to a marked improvement in patient symptoms over the six-week period.

Potential side effect of treatment: The side effects observed during the six-week treatment period are outlined in Table 4. Skin irritation was not reported at any point during the study. In Week 1, 15% of participants experienced headaches, while fatigue was noted by 25%, alongside reports of mild jaw stiffness as an additional side effect. By Week 2, headaches resolved, but fatigue persisted in some participants without any additional side effects. From Week 3 onward, no side effects were reported, indicating an improvement in tolerability as the treatment progressed.

Table 5: Predisposing factors for temporomandibular joint disorders (TMDs) in MPS patients who underwent low-level laser therapy (LLLT).

Predisposing Factor	Yes (n)	No (n)	Yes (%)
Regular Qat consumption	17	3	85
Physical activities straining neck/jaw	10	10	50
Sedentary lifestyle	12	8	60
Sleep position affecting neck/jaw	8	12	40
Poor posture	9	11	45
Frequent stress or anxiety	12	8	60

Table 2: The rates and significance of reduction in Myofascial Pain Symptoms in our patients who underwent low-level laser therapy (LLLT).

Symptom	Initial (n, %)	After 3 Months (n, %)	*p* value
Pain During Chewing	18 (90)	6 (30)	<0.001
Pain During Talking	15 (75)	4 (20)	<0.001
Pain During Jaw Movement	17 (85)	5 (25)	<0.001
Jaw Muscle Tenderness	16 (80)	3 (15)	<0.001

Table 7: Pain intensity (VAS) - initial pain compared to pain 3 months after treatment with low-level laser therapy (LLLT).

Parameter	Initial (Mean±SD)	After 3 Months (Mean±SD)	*p* value
Pain Severity (VAS)	7.5±1.3	3.8±1.0	<0.001
Duration of Pain Episodes (Minutes)	45±12	15±4	<0.001
Frequency of Pain Episodes (Per Day)	4.3±1.5	2.0±0.5	<0.001

Table 3: Efficiency of therapy on maximum mouth opening after treatment with low-level laser therapy (LLLT).

Measurement Interval	MMO (Mean±SD in mm)	% Improvement	*p* value
Initial (Baseline)	27.5±5.0	–	–
After 1 Month	34.0±4.8	11%	<0.001
After 3 Months	41.5±4.2	36%	<0.001

These findings suggest that the treatment was generally well-tolerated, with side effects being mild, transient, and limited to the initial weeks of therapy.

Predisposing factors: Table 5 outlines the predisposing factors associated with the study participants. Regular Qat consumption was the most prevalent factor, reported by 85% (n=17) of participants, highlighting a significant lifestyle influence. Sedentary behavior and frequent stress or anxiety were also common, with both factors reported by 60% (n=12) of the sample. Physical activities that strain the neck or jaw were evenly distributed, with 50% (n=10) of participants identifying this as a contributing factor. Poor posture was reported by 45% (n=9) of participants, while 40% (n=8) identified their sleep position as a factor affecting their neck or jaw. These findings underscore the multifactorial nature of predisposing factors, with lifestyle and behavioral influences playing a prominent role in the study population.

Reduction in myofascial pain symptoms: Table 6 illustrates the reduction in myofascial pain symptoms over three months of treatment. Significant improvements were observed across all measured symptoms. Pain during chewing decreased from 90% (n=18) of participants initially to 30% (n=6) after three months (p<0.001). Similarly, pain during talking dropped from 75% (n=15) to 20% (n=4) (p<0.001), while pain during jaw movement reduced from 85% (n=17) to 25% (n=5) (p<0.001). Jaw muscle tenderness showed the most pronounced improvement, decreasing from 80% (n=16) to just 15% (n=3) (p<0.001). These results demonstrate a statistically significant reduction in all assessed symptoms, indicating the efficacy of the treatment in alleviating myofascial pain.

Pain Severity (VAS) – Initial vs. after 3 months: Table 7 highlights the changes in pain severity, episode duration, and frequency over a three-month period. The mean pain severity, measured using the Visual Analog Scale (VAS), significantly decreased from 7.5±1.3 initially to 3.8±1.0 after three months of treatment (p<0.001). Similarly, the average duration of pain episodes was significantly reduced from 45±12 minutes to 15±4 minutes (p<0.001). The frequency of pain episodes per day also showed a notable decline, decreasing from 4.3±1.5 to 2.0±0.5 (p<0.001).

These findings demonstrate a statistically significant improvement in all measured parameters, indicating the effectiveness of the treatment in reducing both the intensity and impact of myofascial pain.

Efficiency of therapy on maximum mouth opening: Table 8 demonstrates the significant reduction in myofascial pain symptoms after three months of treatment. Pain during chewing was initially reported by 90% (n=18) of participants, which decreased to 30% (n=6) post-treatment (p<0.001). Similarly, pain during talking reduced from 75% (n=15) to 20% (n=4) (p<0.001). Pain during jaw movement showed a marked decline, dropping from 85% (n=17) to 25% (n=5) (p<0.001). Jaw muscle tenderness experienced the greatest improvement, decreasing from 80% (n=16) to 15% (n=3) (p<0.001). These results indicate a statistically significant alleviation of all measured symptoms, highlighting the effectiveness of the treatment in improving myofascial pain outcomes.

Table 9: Changes in quality of life parameters after three months of treatment with low-level laser therapy (LLLT).

Parameter	Initial (Mean±SD)	After 3 Months (Mean±SD)	*p* value
Sleep Quality (VAS 0–10)	4.5±1.2	7.8±1.0	<0.001
Daily Activity Disruption (VAS)	6.0±1.5	2.2±0.8	<0.001
Stress/Anxiety Levels (VAS)	7.0±1.3	3.5±1.1	<0.001

Table 4: The overall efficacy of the therapy across multiple outcome measures for th low-level laser therapy (LLLT).

Outcome Measure	% Patients showing improvement	Mean Improvement (VAS or duration)	*p* value
Reduction in Pain Severity	95	3.7 (VAS)	<0.001
Reduction in Pain Frequency	90	2.3 (Episodes/Day)	<0.001
Reduction in Pain Duration	90	30 Minutes	<0.001
Improved Quality of Life	85	3.3 (VAS)	<0.001

Changes in quality of life: Table 9 presents the changes in quality-of-life parameters following three months of treatment. Sleep quality, measured on a Visual Analog Scale (VAS) from 0 to 10, significantly improved from a mean of 4.5±1.2 at baseline to 7.8±1.0 after three months ($p<0.001$). Daily activity disruption, also assessed using the VAS, decreased from a mean of 6.0±1.5 to 2.2±0.8, indicating a significant reduction in the impact of pain on daily life ($p<0.001$). Stress and anxiety levels, initially at 7.0±1.3, were reduced to 3.5±1.1 after three months ($p<0.001$). These results show a statistically significant improvement in all quality-of-life parameters, demonstrating the positive impact of the treatment on both physical and emotional well-being.

Overall efficacy of therapy: Table 10 summarizes the overall efficacy of the therapy across multiple outcome measures. The majority of patients showed significant improvement, with 95% of participants experiencing a reduction in pain severity, corresponding to a mean improvement of 3.7 on the Visual Analog Scale (VAS) ($p<0.001$). A reduction in pain frequency was observed in 90% of patients, with an average decrease of 2.3 episodes per day ($p<0.001$). Similarly, 90% of patients experienced a reduction in pain duration, with a mean decrease of 30 minutes per episode ($p<0.001$). Additionally, 85% of participants reported an improvement in quality of life, with a mean improvement of 3.3 on the VAS ($p<0.001$). These findings demonstrate the high efficacy of the therapy in reducing pain and improving overall quality of life for the majority of patients.

DISCUSSION

Pain severity and treatment progression

The significant reduction in pain severity over the six-week treatment period in this study is consistent with previous research. Hakgüder *et al*.[17], observed significant reductions in pain across multiple parameters, including spontaneous pain and thermo-graphic values by laser therapy. In the present study, pain severity, measured via the Visual Analog Scale (VAS), decreased from 7.5±1.3 in Week 1 to 3.8±1.0 by Week 6, reflecting a substantial improvement in pain management. These findings confirm that laser therapy is effective in reducing pain over time, with consistent improvements seen as early as the second week and significant relief by Week 5, which persisted through Week 6. Also, de-Moraes Maia *et al.*[1], who also observed lasting improvements in pain intensity following laser treatment.

Side effects and tolerability

In this study, side effects were generally mild and transient. Headaches and fatigue were reported by a subset of participants in the early weeks, but these symptoms resolved by week 2, with no further side effects reported thereafter. This finding is in line with the results of de-Moraes Maia *et al.*[1], who found no adverse effects associated with laser therapy. The absence of skin irritation in the current study further suggests the safety of laser therapy. The initial mild side effects, such as headaches and fatigue, appear to be temporary and manageable, reinforcing the idea that laser treatment is well- accepted by patients. The tolerability observed in this study supports the broader body of research suggesting that laser therapy is not only effective but also a safe treatment option for myofascial pain management. Given the absence of severe side effects, laser therapy can be considered a viable treatment for patients seeking non-invasive options.

Reduction in myofascial pain symptoms

The significant reduction in myofascial pain symptoms, such as pain during chewing, talking, and jaw movement, observed in this study is consistent with the findings of de-Moraes Maia *et al.*[1]. For instance, pain during chewing decreased from 90% to 30% of participants, while pain during talking reduced from 75% to 20%. Jaw muscle tenderness showed the most pronounced improvement, dropping from 80% to 15%. These changes were statistically significant ($p<0.001$) and indicate the efficiency of laser treatment in alleviating myofascial pain.

Efficiency of therapy on maximum mouth opening

Although the study did not explicitly measure maximum mouth opening, the reduction in pain severity and muscle tenderness suggests an indirect improvement in jaw function. This aligns with the findings of Hakgüder *et al.*[17], where patients receiving targeted therapy experienced functional improvements, including increased jaw mobility. Given that pain reduction and muscle tenderness often correlate with improved functional outcomes, it is reasonable to infer that laser therapy could lead to better jaw function and mouth opening, although further studies are needed to directly assess this parameter.

Predisposing factors and lifestyle influence

A key finding in this study was the significant role of lifestyle factors in the prevalence of myofascial pain. The most common predisposing factor was regular Qat consumption, reported by 85% of participants, followed by sedentary behavior (60%), stress or anxiety (60%), and physical activities that strain the neck or jaw (50%). These findings underscore the multifactorial nature of myofascial pain and support the notion that lifestyle and behavioral influences play a significant role in the development and exacerbation of pain. Comparable patterns have been observed in studies by Hakgüder *et al.*[17], where stress, poor posture, and physical strain were also identified as contributing factors. The high prevalence of Qat consumption in this population highlights the importance of considering local lifestyle factors when diagnosing and treating myofascial pain. Addressing these predisposing factors through behavioral interventions and patient education could further enhance the efficacy of laser therapy.

Laser therapy dosage and outcomes

The laser dosage of 6 J/cm² used in this study was effective in reducing pain severity, with a 49% reduction in pain over the three-month period. These results are consistent with the findings of deMoraes Maia *et al.*[1], who used a similar laser dosage and observed significant reductions in pain intensity. The consistent application of this dosage throughout the treatment period underscores the importance of precise treatment parameters in achieving optimal results. The reduction in pain severity observed in this study is consistent with the outcomes reported by other researchers using laser therapy for myofascial pain. The dosage of 6 J/cm² appears to be an effective therapeutic approach for managing pain, and these findings suggest that laser therapy could be a first-line treatment for myofascial pain.

Comparison with other modalities

When compared with other modalities, laser therapy appears to offer superior results in terms of both pain reduction and functional improvement. Hakgüder *et al.*[17], found significant pain relief in patients treated with a variety of therapies, including non-laser interventions, but the more rapid and sustained relief provided by laser therapy in this study suggests that it may be more effective than other treatments. De-Moraes Maia *et al.*[1], similarly found that laser therapy outperformed placebo treatments in terms of both pain reduction and patient satisfaction.

Clinical implications

The findings of this study have significant clinical implications. Laser therapy demonstrates strong potential as an effective, non-invasive treatment for myofascial pain. The consistent reduction in pain severity, frequency, and duration over six weeks and three months indicates that laser therapy can provide substantial symptom relief for patients with myofascial pain disorders. Furthermore, the treatment's excellent safety profile and minimal side effects make it a viable option for patients seeking alternative pain management methods.

Incorporating lifestyle modifications, such as stress management and improved posture, alongside laser therapy may further enhance treatment outcomes and help prevent the recurrence of myofascial pain.

Limitation of the study

The limited sample size and brief follow-up time are the study's primary shortcomings. To ascertain the efficacy of low-level laser treatment in treating TMJ problems and averting future relapses, long-term follow-up studies that last longer than three months are advised. Future research is recommended using a larger sample size, different laser wavelengths, different doses, and different application times for patients with TMJ disorders. Future research is also recommended to evaluate the anatomy of the muscles and TMJ using MRI or ultrasound before and after low-level laser therapy.

CONCLUSIONS

LLLT is a safe, effective treatment for MPDs; it's non-invasive and causes no side effects. It also reduces pain and inflammation. However, it does fix issues like jaw clicking or deviation. LLLT is better for short-term use. It's ideal for muscle-related pain but doesn't fully resolve complex TMJ problems. Generally, LLLT is a simple, drug-free option for quick relief of jaw pain, compared with long-term solutions for complicated cases.

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AUTHOR'S CONTRIBUTIONS

Sulaiman ASA: writing the original draft, methodology, investigation. **Abbas AMA:** Conceptualization. **Majid ALAA:** writing, review. **Al-Rohmi FMA:** writing, editing. **Al-Muntaser AQH:** formal analysis, data processing. **Al-Moyed KA:** statistical analysis, data processing. **Al-Shamahy HA:** data processing, conceptualization. **Al-dossary OAI:** data processing. **Al-Khorasani MAM:** editing. **Alsubari RAS:** data processing, review. Final manuscript was checked an approved by all authors.

DATA AVAILABILITY

The empirical data used to support the study's results can be obtained upon request from the corresponding author.

CONFLICT OF INTEREST

Regarding this project, there are no conflicts of interest.

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