

Medical Science

To Cite:

Chourasia S, Radhakrishnan D, Mendhe K. Effectiveness of Muscle Energy Technique and Intra-Oral Massage on Helkimo Index and pain in myogenic temporomandibular dysfunction: A case report. *Medical Science* 2024; 28: e148ms3417
doi: <https://doi.org/10.54905/disssi.v28i154.e148ms3417>

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Peer-Review History

Received: 02 September 2024
Reviewed & Revised: 06/September/2024 to 29/November/2024
Accepted: 03 December 2024
Published: 07 December 2024

Peer-review Method

External peer-review was done through double-blind method.

Medical Science
pISSN 2321-7359; eISSN 2321-7367



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Effectiveness of Muscle Energy Technique and Intra-Oral Massage on Helkimo Index and pain in myogenic temporomandibular dysfunction: A case report

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ABSTRACT

Temporomandibular disorders (TMD) refers to a group of conditions which involves the orofacial region dividing into those affecting the masticatory muscle & those affecting the temporomandibular joint (TMJ). This case report discusses about a 27-year-old female suffering from myogenic TMD who had limited mouth opening, and frequent migraines apart from chronic jaw pain. She had a high Helkimo Index score with an increased pain levels on the Visual Analogue Scale (VAS). Objective of the 2-week intervention program was to reduce pain and maximize jaw function with Muscle energy Technique (MET) & Intra-Oral Massage (IOM). Assessment at the baseline revealed extensive discomfort and difficulty in jaw movements. Patient's VAS pain level had dropped from 7 to 2 in 2nd week and also had scored a lower Helkimo index. She had increased jaw movement, pain reduction and henceforth improved activity in daily life. MET and IOM as adjunctive therapies helps in managing myogenic TMD, indicating that a combination of manual therapy approaches can offer patients complete and long-lasting relief. More studies should be carried out of these combinations of therapies to probe essential advantages in the long term.

Keywords: Myogenic TMD, VAS, Helkimo score, Pain, Masseter

1. INTRODUCTION

The term Temporomandibular disorders (TMD) represent an umbrella of pathological conditions that involves the Temporomandibular joint (TMJ), masticatory muscles, and related anatomical structures (Anders and Marklund,

2020). These disorders transpire to induce pain, functional limitations in activities, and a remarkable decrease in the overall quality of an individual's life. The etiology of this disorder can be multifaceted, encompassing components such as hyper activity of muscle, psychological stress, and nocturnal habits like bruxism (Craane et al., 2012). The prevalence of TMD is peculiar, affecting a considerable mass of the population, as studies have scaled as many as 25% of individuals might encounter symptomatic manifestations of this disorder at some juncture in their lives (Murphy et al., 2013).

The peak age group of affecting population is 20-40 years with a dominance of women over men. An individual's overall physical and mental health is compromised due to this syndrome. Activity in daily life like talking, eating and yawning are interrupted (Homeida et al., 2022). A diagnostic tool called Helkimo index indicates the severity of TMD based on objective clinical parameters and subjective symptoms. Apart from this tool screening of TMD includes palpation of the jaw muscles and TMJ, checking range of movement of jaw, and evaluation of tenderness. Healthcare specialists can obtain a measurable gauge of the functional status of the TMJ and associated structures, thereby catalysing the treatment quality and patient outcomes (Kapos et al., 2020).

Traditional therapeutic programs for TMD embrace various modalities, ranging from drug-therapy and physiotherapy to occlusal splints and behavioral interventions. Muscle relaxants, anti-pyretic agents, and non-steroidal anti-inflammatory drugs are prescribed to mitigate all cardinal signs of inflammation. Physical therapy interventions are targeted exercises which aims at boosting jaw mobility, reducing muscle tension, and to inordinate masticatory function (Abouelhuda et al., 2018). Approaches like Muscle Energy Technique (MET) and Intra-Oral Massage (IOM) have gained benchmark attention for their outstanding utility in managing Myogenic TMD. These techniques objectifies to correct muscle dysfunction and recruit proper joint mechanics through particular manual techniques (Brandão et al., 2021).

Muscle energy technique maximizes muscular contractions against controlled resistance; to revive muscle function and joint movement. MET strives to lengthen spurt and shunt muscles, improvises weakened muscle groups, and reestablishes standard movement patterns which utilizes the concept of neuromuscular reeducation. MET can be standardized as a clinical implication on the masticatory muscles to deduce hyperactivity, deactivate discomfort, and develop jaw functionality. Intra-Oral Massage (IOM) constitutes a specialized maneuver that works in massaging the muscles within the mouth, including the masseter, temporalis, and pterygoid muscles. This treatment aims to deplete tension in muscle tendon, rejuvenate circulation, and vanish the trigger points within the masticatory muscles.

IOM enables the patient to minimize pain, maximize functionality of the muscle, and overall TMJ mechanics (Santiesteban, 1989). Amalgamation of Manual Therapy (MET) and Intraoral Myotherapy (IOM) donates a promising strategy that may give a synergistic and comprehensive measure to effectively cope myogenic Temporomandibular Disorders (TMD). The integration of MET, which primarily focuses on neuromuscular reeducation and enhancing muscle function through controlled contractions, with IOM, which directly targets muscle tension and trigger points within the oral cavity, encompasses a dual-pronged technique that addresses both external and internal facets of masticatory muscle dysfunction.

These methods of treatment has the potential to deliver more relief for persons experiencing myogenic TMD (Erik et al., 2019). The case report finds the effect of MET and IOM in the management of myogenic TMD, with the Helkimo Index and pain intensity as the primary outcome measures. In summary, the combining effect of MET and IOM aids in coping the complex nature of myogenic TMD. Goal of this case report is to present the practical application & scope of these manual therapies, which will direct to contribute patient outcomes and improved quality of life.

2. CASE PRESENTATION

27 years old patient had chief complaints of difficulty in opening the jaw, repeated headaches since 6 months. ADLs like chewing and talking was intervened due to jaw pain; which substantially disturbed her functioning. Tenderness was identified in the masticator muscles, specifically the masseter and pterygoids and limitations in mandibular mobility with clinical tests. The Helkimo Index assessment of the patient indicated a mark dysfunction ranging from moderate to severe. She had a history of bruxism and disclosed heightened stress levels attributed to her demanding occupational responsibilities. Despite undergoing prior treatments such as analgesics these measures only provided transient relief. Considering the persistence of her symptoms and the nature of her condition; she was referred to the Physiotherapy Department from the Dental Department.

3. INVESTIGATIONS

Clinical Examination

The patient exhibited evident asymmetry in jaw movements, alongside encountering challenges in fully opening her mouth. The palpation procedure revealed tenderness in the masseter, pterygoids and also temporalis muscles. Measurement of jaw range (Table 1) was procured with an instrument called therabite scale (Figure 1). She had a restricted mandibular range of motion, with an inter-incisal opening of 25 mm (Figure 2). Lateral movement was around 5mm (Figure 3).

Table 1 Measurement of jaw range

Jaw Range of Motion (ROM)	ROM (in mm)	Normal Range
Inter-incisal opening	25mm	40-50mm
Lateral movement	5mm	8-10mm

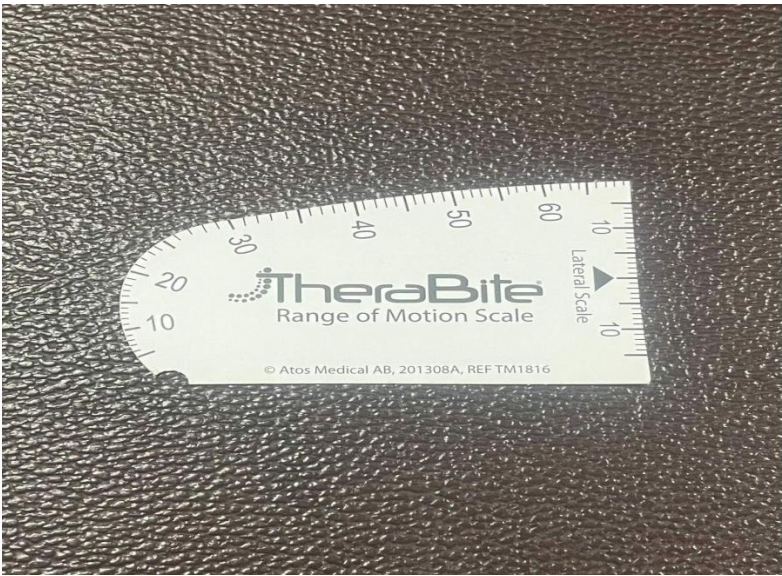


Figure 1 Therabite scale to measure jaw range of motion

Helkimo Index

The Clinical Dysfunction Index (Di) summed a score of 10 by the patient. This dysfunction elaborates various aspects such as muscle tenderness, joint sounds, and constraints in jaw movements, enumerating a comprehensive assessment of the patient's temporomandibular joint (TMJ) health and function.

Pain Assessment

The patient self-reported a pain level of 7 on 10 with the help of Visual analog scale (VAS). The pain was predominantly pointed to the jaw and temple regions. Intriguingly, the pain experienced by the patient was exacerbated by jaw movements, as well as prolonged periods of speaking or chewing.

Timeline

The patient received both intra-oral massage (IOM) and muscle energy technique (MET) as part of a combination therapy regimen during two-weeks. Initial evaluations revealed a high Helkimo Index score, limited jaw movement, and extreme muscle soreness. The first MET session was carried out on Day 1. The patient experienced her first IOM session on Day 2 and reported feeling pain alleviation right away. Days 4, 6, 8, 10, and 12 saw a switch between MET, IOM, and combined therapies in subsequent sessions, which gradually increased her muscle function and decreased her pain. By Day 14, reassessment found a marked improvement: Her Helkimo Index score declined from 10 to 3 and her pain level went from 7 to 2 on the Visual Analogue Scale.



Figure 2 Inter -incisal distance measuring 25 mm in sitting



Figure 3 Lateral Movement

Intervention

Table 2 and Figure 4, 5, 6, 7 gives a summary of Rehabilitation received by the 27-year-old patient in 2 weeks. Each session lasting for 30 minutes.

Table 2 Brief Summary of Physiotherapy Rehabilitation

Sr No.	Intervention and Goal	Procedure	Dosage
1	To educate the patient about the condition and possible outcomes of rehabilitation.	Patient education about the Role of Physiotherapy Rehabilitation in Myogenic TMJ.	NA
2	To improve mouth opening. Muscle Energy Technique for lateral pterygoids. (Figure 4)	The patient was told to open their mouth despite resistance from the therapist's hand or their own. The patient tried to open their mouth for around ten seconds by placing their elbow on the table and their chin in their hand. To a comfortable maximum the jaw was opened, returned to its new boundary while stretching. This MET method resulted in the relaxation of the shortened or tense muscles.	Three times with 10 second hold.
3	To improve mouth closing. Muscle Energy Technique for Masseter (Figure 5).	The patient was sitting down. To release the short, tight muscles via post-isometric relaxation (with little effort) counter pressure was required to prevent the open jaw from closing. The patient had to place their thumbs—which were adequately protected, protected correctly along the upper surface of their lower back teeth to perform an isometric action. This technique is known as the practitioner-direct	Three times with a hold period of 5 sec

		method—used the practitioner to accomplish so.	
4	To improve side- to -side movement. MET for medial pterygoids (Figure 6).	The patient sat with her back to the practitioner, who laid her head on therapist's chest. The patient reclined to one side—in this case, the left. The patient parted her lips and allowed chin to drop as the practitioner placed her left hand on the mandible and curled fingers away from her and under the jaw. Patient's jaw was gently brought up to the chest, the practitioner tried to draw the patient's jaw laterally. Patient and the practitioner relaxed simultaneously following a brief period of modest isometric contraction, and the jaw usually showed significant lateral excursion.	Ten times
5	To Reduce Pain. Intra-Oral Massage for Lateral Pterygoids and Medial Pterygoids.	Depending on side, the practitioner was positioned either Homolateral or contra laterally. Along the lateral wall of the pharynx posterior to the last molar, a gloved index finger was placed. The tissues beneath the pterygoid originate from the lateral pterygoid plate of the pharynx. The jaw was positioned for which the lateral pull was directed away from the side that varied during the opening. Cephalad and posteriorly the sphenoid bones were crushed. Avoiding direct contact with the hamulus was done with great caution.	Five seconds maintained.
6.	Intraoral Massage for Masseter (Figure 7)	Cheek was pinched below the cheekbone. The cause of muscular tension was identified in the masseter tendon. The circular motion approach was used at the masseter region. The afflicted area was gently massaged which promoted muscle relaxation. Until the muscle began to relax the point was gently touched with the fingers.	The contact was sustained for five seconds



Figure 4 Muscle energy technique for lateral pterygoid



Figure 5 Muscle energy technique for masseter

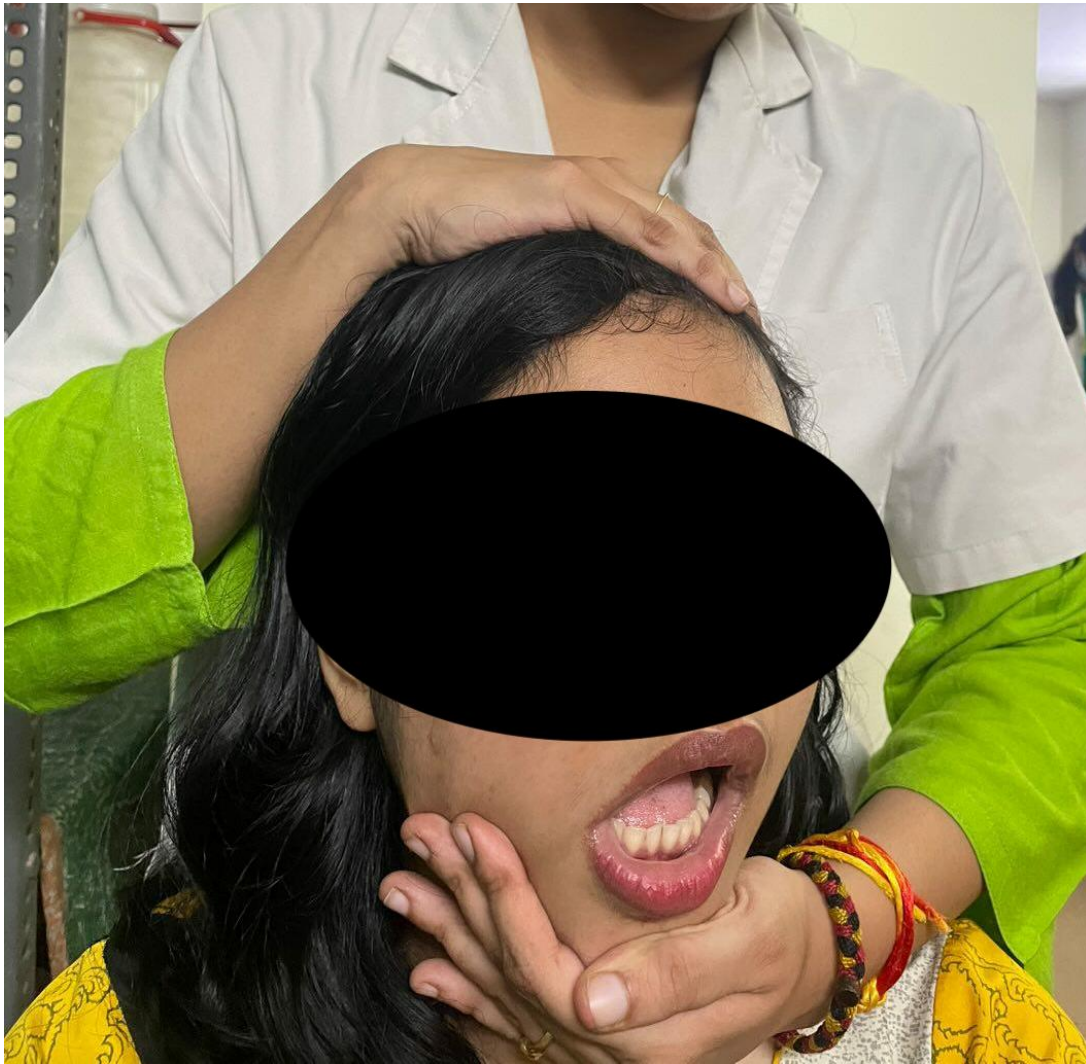


Figure 6 Muscle energy technique for medial pterygoid

Follow-up and outcome measures

It was observed that the patient exhibited remarkable advancement in their condition, upon completion of a meticulously structured intervention program encompassing the utilization of the Muscle Energy Technique (MET) and Intra-Oral Massage (IOM). After the duration of four weeks undergoing the amalgamated therapeutic approaches, the Helkimo Index score illustrated a noteworthy enhancement to 3 out of 25, thereby signifying a transition from a state of severe dysfunction to a milder nature. Notable reductions in pain levels were also evident, as indicated by the VAS score diminishing to 2 out of 10.

Furthermore, there was a discernible expansion in the range of mandibular motion, coupled with a substantial decrease in the degree of deviation observed during jaw opening and closing. Notable findings from palpation of the masticatory muscles revealed a pronounced alleviation in tenderness and trigger points. Therefore, MET plus IOM together are effective in treating myogenic TMD: which subsided pain, improvised muscle functionality, and normalized the biomechanics of TMJ.



Figure 7 Massage for masseter

4. DISCUSSION

This case report points up the boon of applying Intra-Oral Massage (IOM) plus Muscle Energy Technique (MET) for correcting the cause of myogenic temporomandibular dysfunction (TMD). Considerable improvement in the patient's functional abilities and pain levels were indicated by significant decrease in the patient's Helkimo Index scores and Visual Analogue Scale (VAS). Outcome measures were consistent with other research that stresses the effectiveness of manual treatments in the management of symptoms associated with TMD (Capellini et al., 2006). MET involves contraction of muscle against resistance to increase joint mobility and muscle function. Methodology of MET proves to strengthen weaker muscles & lengthen shortness of the muscles (Kalamir et al., 2013).

In addition, MET activates neuromuscular function, decreases muscle tension of the masticatory muscles, which aids enhanced jaw function & thus reduces pain. The masseter, temporalis, and pterygoid muscles are muscles of mastication that are targeted by IOM (Bae and Park, 2013). IOM focuses on decreasing the amount of myofascial trigger points, enhancing blood flow, and releasing muscle tension in these muscles (Wu et al., 2021). Applying MET and IOM together may have synergistic effects by treating the internal and external masticatory processes. The favourable results imply that MET and IOM may be valuable supplements to the treatment toolkit for myogenic TMD.

Physicians treating patients with TMD, especially those presenting with symptoms associated with muscles, should think about using these manual techniques in their therapy regimens (Crăciun et al., 2022). Furthermore, the noteworthy dwindle in Helkimo Index scores and VAS pain ratings underscores the possibility that these methods could improve patient quality of life by suppressing pain and enhancing jaw function. Even if this case report's outcomes are encouraging, it's crucial to recognize its limitations. Further extensive research is required to verify whether or not they can be applied to other individuals, since the results are based on a single patient. Randomized studies should be the goal of future research.

5. CONCLUSION

The case study of a 27-year-old female patient diagnosed with myogenic temporomandibular disorder (TMD) expresses the therapeutic benefits of integrating Intra-Oral Massage (IOM) with Muscle Energy Technique (MET). The patient showed significant improvements in jaw mobility and muscular function during the two-week intervention as indicated by lower Visual Analogue Scale (VAS) discomfort levels and mark down Helkimo Index scores. By the dual combination of MET and IOM, interior and exterior muscle dysfunction were successfully treated, offering complete alleviation and improving the patient's quality of life. This emphasizes the importance of manual therapies in the multidisciplinary treatment of TMD, which needs for more study and practical implementation.

Acknowledgement

We thank the participant who contributed samples to the study. My sincere thanks to my guide, mentor who guided me radically through all the time of case report. I am grateful to my close entourages, my juniors who helped me in tough times of study. I am also thankful to my family members who supported through thick and thin.

Author Contributions

First author- Framing of the study, ethics approval, and statistics. Second author- Photo collection, writing of paper, data collection, assessment and treatment. Third author- Statistics.

Ethical approval

The study was approved by the Medical ethics Committee of college. APPROVAL CODE: VSPMS COPT/IEC/MSK-PG 01/2022

Informed Consent

Written and oral informed consent was obtained from participant included in the study.

Funding

This study has not received any external funding.

Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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