October University for Modern Sciences and Arts

MSA Dental Journal

https://msadj.journals.ekb.eg/ PRINT ISSN: 2812 - 4944 VOL. 4, Issue 4, 27-31 October, 2025

Evaluation of Pain Relief Using Keinso Taping Technique versus Plain Local Anesthesia Injection for Treatment of Acute Myofascial Pain Dysfunction Syndrome of the Temporomandibular Joint. A Randomized Clinical Trial

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ARTICLE INFO.

Article History:
Received 26 August 2025
Revised 3 October 2025
Accepted 6 October 2025
Available online 26 October 2025

Keywords:
Myofascial Pain; Local anesthesia; trigger points; Keinzo taping.

Abstract

Background: This study aimed to compare the efficacy of Kinesio Taping (KT) versus plain local anesthesia (LA) injection for pain relief in patients experiencing acute myofascial pain dysfunction syndrome (MPDS)

Methods: The trial was conducted on 12 medically free patients experiencing acute MPDS of the temporomandibular joint. Patients were randomly assigned into two equal groups (n=6 each). Group 1 (control) received trigger point injections with 3% mepivacaine. Group 2 (intervention) received Kinesio taping. Clinical assessment included pre-operative evaluation of trigger points, pain score using the Visual Analogue Scale (VAS), and maximum mouth opening (MMO) using a caliper.

Results: Both groups demonstrated highly statistically significant improvements in VAS and MMO ($P < 0.001$ for VAS, $P = 0.001$ for MMO in both groups). Specifically, in Group 1, the median VAS decreased from 8.5 to 3, and MMO increased from 30mm to 37mm. In Group 2, the median VAS showed an even more pronounced decrease from 9.5 to 0, and MMO improved from 35.5mm to 41.5mm. The inter-group comparison revealed no statistically significant difference in maximum mouth opening between the two groups at any time point ($P > 0.05$). However, for pain scores (VAS), Group 2 demonstrated a highly statistically significant superior long-term pain reduction compared to Group 1 at both the 1-month and 3-month follow-up periods ($P < 0.001$).

Conclusion: The study concluded that both treatments are beneficial for MPDS, yet Kinesio Taping offers a more prolonged pain relief, suggesting it as a valuable, non-invasive alternative for managing this condition.

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1 Introduction

Myofascial Pain Dysfunction syndrome (MPDS) is a multifactorial musculoskeletal disorder with a wide range of symptoms and severity. It is characterized by multiple trigger points (MTrPs), also known as hyperirritable points, in a single or group of muscles, taut bands, referred pain, development of sensory changes, and local twitch response in the affected muscles.[1] It is known that during the lifetime, approximately 85% of the population have myofascial pain dysfunction syndrome at least once.[2]

*T*he treatment is based on reducing the pain, and removing the local or systemic factors that caused the syndrome. The aim of treatment is to inactivate the MTrPs by loosening the taut bands. There are myriads treatment modalities which includes patient education about removing the cause, drugs including nonsteroidal anti-inflammatory drugs (NSAIDs), physical therapy, kinesio taping, stretch and spray techniques, dry needling, local injections, and exercise.[3]

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Trigger point injection is known to be one of the most effective methods in treatment of MPS. It is found to be effective in reducing pain and muscular spasm, increasing the range of motion (ROM) and local blood circulation, and moreover cause fibrotic scar formation on trigger points. Injection materials include Local anesthetic drugs, saline, steroid, botulinum toxin, and dry needling techniques.[4]

Local anesthetic (LA) injections of TrPs have been found effective in MPS. Studies mostly included the lidocaine injection directly in TrPs which provided pain relief in short time by inactivating trigger points regarding both needling and the action of active drug.[5]

Kinesio taping (KT) is a non-invasive and well-tolerated technique has been developed by Dr. Kenzo Kase and widely used for the treatment of musculoskeletal problems including MPS and neck pain. It is water resistant, lightweight, elastic and has a capacity of stretching which aids in decreasing pain in the musculoskeletal diseases like Myofascial pain dysfunction syndrome.[6]

Some of the major effects of KT are decreasing pain, reducing edema by providing drainage of local blood and lymph fluid and relaxing the muscles Elevating the skin provides space which enhances the fascial movement and removes inflammatory products.[7]

Thus, this study has been conducted to compare the effect of both methods on the pain relief of patients with myofascial pain dysfunction syndrome, aiming to solve the problem of increasing muscles of mastication pain for patients in their daily mouth opening. Also, to reduce the community's fear from such a problem, which sometimes prevent patients from seeking treatment at their dentists leading to more serious complications that can be avoided.

2 Materials and Methods

2.1 Aim of the study:

The aim of this study was to assess pain relief in patients with acute myofascial pain at the masseter muscle managed by keinso tapes versus plain local anesthesia injection. This study was conducted on 12 patients collected from the outpatient clinic of oral surgery and anesthesia department, faculty of Dentistry, MSA University, Egypt with ethical approval number REC-D 321104.

2.2 Sample size calculation

Based on the previous paper by Yilmaz et al 2021, If there is truly no difference between keinzo taping and local anesthesia with effect size of 1.8, then 6 patients in each group are required to be 80% sure that the limits of a two-sided 95% confidence interval will exclude a difference in means of more than 1.5.[8]

2.3 Samples selection:

Inclusion Criteria:

-Medically free patients.

-Acute Myofascial Pain Dysfunction Syndrome of the TMJ for more than 1 week with active trigger points in the masseter muscle.

-Failure of conservative strategies such as anti-inflammatory therapy with NSAID, heat application or Physiotherapy.

-Age range between 18 and 40 years with no sex predilection.

-Patients who could understand Visual Analogue Scales (VAS) and are able to sign informed consent

Exclusion Criteria:

-Patients with systemic disorders e.g fibromyalgia syndrome, and neurologic disorders

-Patients with psychological disorders, and drug or alcohol dependency.

2.4 clinical assessment:

Patients were evaluated pre-operatively to confirm the presence of trigger points at the masseter muscle. Pain score was measured pre-operatively using VAS (T0), and maximum mouth opening was measured using caliper (T0). Patients were randomly assigned into the two groups with equal distribution

2.5 Intervention:

For the control group:

Injection on the trigger point was done by the use of 22-gauge needle. Trigger point was secured between thumb and index fingers. After the skin was cleaned with antiseptic solution, local anesthesia mepivacaine 3% (Alexandria Co. for pharmaceutical & chemical industries, Egypt) was delivered while the patient was seating comfortably. The needle was inserted perpendicularly through the skin and moved forward until the trigger point was reached. The target point was identified by getting local twitch response or contraction of the band with pain.

For the intervention group:

15- 20 cm wide tapes were cut in a Y-shape fashion. The skin around the masseter muscle was cleaned and the tapes were placed following the muscle's origin and insertion. The wider sections were passively placed at the origin of the masseter muscles while the ends were attached to the insertion of the masseter muscle. (Fig.1) Patients were instructed and educated to replace the tape daily in the early morning for one week. Starting from the second week, patients were instructed and educated to put the tape for one whole week then replace it with a new one for a total of 3 months.

Figure 1. Keinzo taping application

2.6 Post-operative care:

Patients were instructed not to consume any pain killers or anti-inflammatory drugs. Follow-up visits were scheduled for one week, one month, and three months post-operative. VAS and mouth opening were recorded at one week (T1), one month (T2), and three months (T3).

2.7 Statistical Analysis

The statistical analyses were conducted using IBM SPSS Statistics version 25. The software was employed to perform Friedman's two way test for intra-groups analysis and Kruskal Wallis test for inter-groups analysis.

3 Results

This study was conducted on 12 patients collected from the outpatient clinic of department of oral surgery & anesthesia, Faculty of Dentistry, MSA University. (descriptive statistics). Table 1

Table 1: Descriptive statistics

	Number	Males	Females	Mean age	Standard deviation
GP 1	6	2	4	44.33	9.5
GP 2	6	4	2		11.4

Group I statistical analysis:

Friedman's two-way analysis was done to check the effect of local anesthesia on pain score and mouth opening. There was highly statistical significance between pre-operative and three months post-operative results for both VAS and MMO. **Table 2**

Table 2: GP I analysis

	VAS					MMO				
	Pre-op	1 week	1 mo	3 months	P value	Pre-op	1 week	1 month	3 months	P-value
Median	8.5	7	3.5	3	< 0.001	30	32	36.5	37	0.001
Variance	2.08	1.35	2.44	2.2		19.36	17.36	12.56	13.1	
Minimum	6	5	2	1		26	29	35	35	
Maximum	10	9	8	7		37	40	44	44	
Range	4	4	6	6		11	11	9	9	

Group II statistical analysis:

Friedman's two way analysis was done to check the effect of keinso tapes on pain score and mouth opening. There was highly statistical significance between pre-operative and three months post-operative results for both VAS and MMO. **Table 3**

Table 3: GP II analysis

	VAS					MMO				
	Pre.op	1 week	1 month	3 months	P value	Pre.op	1 week	1 month	3 months	P value
Median	9.5	7	2	0	< 0.001	35.5	38	41.5	41.5	0.001
Variance	0.6	0.8	0.2	0.7		7.7	5.6	7.6	7.5	
Minimum	9	6	1	0		32	35	37	38	
Maximum	10	8	2	2		39	41	45	45	
Range	1	2	1	0		7	6	8	7	

Inter group comparison

Kruskal-Wallis test was used for inter-groups comparison over time. For the pain score there was highly statistical significance of the median at 1 month (3.5/2) and 3 months (3/0) between group I and II.While for maximum mouth opening, there was no statistical significance between the two groups. **Table 4**

Table 4: Inter-group analysis

	Pre-op (GPI vs GPII)	1 week (GPI vs GPII)	1 month (GPI vs GPII)	3 months (GPI vs GPII)
VAS	0.313	0.630	< 0.001	< 0.001
MMO	0.065	0.054	0.091	0.107

4 Discussion

Myofascial Pain Dysfunction syndrome is a prevalent multifactorial musculoskeletal disorder affecting approximately 85% of the population, characterized by hyperirritable trigger points (TrPs) in muscles, referred pain, and sensory changes. Treatment primarily aims to inactivate these TrPs and alleviate pain through various modalities including medication, physical therapy, and local injections. Trigger point injection, particularly with local anesthetics like lidocaine, is highly effective in reducing pain and spasm by inactivating TrPs. Another non-invasive technique, Kinesio taping (KT), is also widely used for musculoskeletal issues like MPS, working by decreasing pain, reducing edema, and relaxing muscles. Given the significant impact of MPS, particularly on mastication muscles causing daily mouth opening difficulties and patient apprehension towards seeking dental treatment,

this study was conducted to compare the efficacy of both injection and Kinesio taping methods in pain relief for patients suffering from myofascial pain dysfunction syndrome.

This study investigated the comparative efficacy of local anesthetic (LA) trigger point injections and Kinesio Taping (KT) in the management of Myofascial Pain Syndrome (MPS), specifically focusing on pain relief (VAS) and maximum mouth opening (MMO). The findings provide valuable insights into the short-term and medium-term outcomes of these two distinct therapeutic approaches.

Our descriptive statistics (Table 1) revealed that the two groups, though small (n=6 each), had some differences in age and gender distribution. While Group 1 (LA) had a slightly older mean age and more females, and Group 2 (KT) had a younger mean age and more males, these demographic variations are noted, but given the sample size, their potential impact on outcomes would ideally be explored further in larger studies. The similar pre-operative pain scores and mouth opening capacities (as indicated by non-significant p-values in Table 4 for pre-op comparison) suggest that both groups started with comparable baseline conditions regarding the severity of their MPS symptoms.

The intra-group analysis using Friedman's two-way analysis demonstrated the significant effectiveness of both treatment modalities individually. In Group 1, local anesthetic injections led to a highly statistically significant reduction in pain (VAS) and a significant improvement in maximum mouth opening (MMO) over the three-month follow-up period. This aligns with existing literature, which consistently reports the immediate and short-term benefits of LA injections in inactivating trigger points, reducing local muscle spasm, and enhancing blood circulation.[4,9] The median VAS dropping from 8.5 to 3 and MMO increasing from 30mm to 37mm underscores the clinical relevance of this improvement for patients experiencing daily pain and restricted oral function.

Similarly, Group 2, treated with Kinesio Taping, also exhibited a highly statistically significant improvement in both VAS and MMO over the three-month period. The median VAS decreased even more dramatically, from 9.5 pre-op to 0 at 3 months, and MMO improved from 35.5mm to 41.5mm. This supports the proposed mechanisms of KT, which include pain reduction, enhanced lymphatic drainage, and muscle relaxation through skin elevation and fascial movement.[6,7] The significant within-group improvements for both treatments confirm their respective roles as effective interventions for MPS symptoms.

The inter-group comparison using the Kruskal-Wallis test provided the most critical comparative insights. While both groups showed comparable improvements in maximum mouth opening (MMO) throughout the study period ($P > 0.05$ at all time points), suggesting that both LA injections and KT are equally effective in restoring oral range of motion, a notable difference emerged in pain relief (VAS). Specifically, Kinesio Taping (Group II) demonstrated a highly statistically significant superior long-term pain reduction compared to local anesthetic injections (Group I) at both the 1-month and 3-month follow-up periods ($P < 0.001$). This suggests that while injections offer immediate relief, KT might provide more sustained pain control or have cumulative effects that become more pronounced over time. The median VAS score reaching 0 in the KT group by 3 months is particularly striking, indicating a more complete resolution of pain for a substantial portion of these patients.

The superior long-term pain relief observed with Kinesio Taping could be attributed to its continuous therapeutic effect, potentially promoting sustained relaxation of taut bands, improved local circulation, and reduced inflammatory products over extended periods compared to the more transient effect of a single local anesthetic injection. Furthermore, KT is a non-invasive, well-tolerated technique, which may contribute to better patient compliance and a more positive overall treatment experience, potentially influencing long-term outcomes.[6,10] The study's aim to address the increasing mastication muscle pain and associated patient fear from seeking dental treatment is directly supported by these findings, particularly the promising long-term pain relief offered by Kinesio Taping, which could encourage patients to seek and complete treatment without apprehension often associated with invasive procedures.

5 limitations

The small sample size (n=6 per group) is a significant limitation, which may restrict the generalizability of these findings. While statistically significant differences were observed, larger randomized controlled trials are needed to confirm these results and explore potential confounding factors such as baseline demographic differences. Future research should also consider longer follow-up periods and a broader range of outcome measures to provide a more comprehensive understanding of the long-term benefits and potential.

6 Conclusion

This study suggests that while both local anesthetic trigger point injections and Kinesio Taping are effective in improving maximum mouth opening for MPDS patients, Kinesio Taping demonstrates a superior and more sustained effect on pain reduction over a three-month period. These findings advocate for the consideration of Kinesio Taping as a valuable, possibly more enduring, non-invasive option for pain management in Myofascial Pain Syndrome, offering a potential solution to alleviate patient fear and improve overall oral health outcomes.

Authors' Contributions

Rania Ihab: research idea and study conduction

Mohamed Hamdy: data analysis and scientific writing

Conflict of interest

The authors declare that they hold no competing interests.

Funding

The research study was self- funded by the authors.

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