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EFFECT OF IASTM ALONG MAITLAND SCAPULOTHOTRACIC JOINT MOBILIZATION IN THE RHOMBOID MUSCLE PAIN

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A B S T R A C T

Background and Objective: Rhomboid muscle pain is a common condition that can significantly affect an individual's functional ability and quality of life. Instrument-Assisted Soft Tissue Mobilization (IASTM) and joint mobilization are therapeutic techniques that have garnered attention for their effectiveness in pain management. To assess the effectiveness of IASTM combined with Maitland scapulothoracic joint mobilization against other conventional physiotherapy in alleviating pain among patients suffering from rhomboid muscle pain.

Methods: A total of 30 subjects with rhomboid muscle pain were randomly assigned to two groups: Group A received IASTM combined with Maitland mobilization, while Group B received conventional physiotherapy. Pain levels were assessed pre- and post-intervention using the Visual Analog Scale (VAS) and Numerical Pain Rating Scale (NPRS). The paired t-test was utilized to analyze differences between pre- and post-intervention scores within each group.

Results: There was a marked improvement in both groups. For Group A, the VAS scores significantly decreased (t-statistic = 9.92, p-value = 1.03 times 10^{-7}, and NPRS scores reflected a marked improvement (t-statistic = 11.82, p-value = 1.14 times 10^{-8}, showing high efficacy of the combined intervention. Group B achieved considerable reductions both in VAS (t-statistic = 8.40, p-value = 7.68 times 10^{-7}) as well as in NPRS score (t-statistic = 16.36, p-value = \1.60 times 10^{-10 }. All these prove the fact that treatment with conventional physiotherapy enhances pain management and also proved in the present analysis that it even outshines this benefit.

Conclusion: The results of this study suggest that the combination of IASTM and Maitland mobilization is more effective than conventional physiotherapy alone in managing rhomboid muscle pain. These techniques may be added to clinical practice to facilitate better outcomes for patients who experience pain and functional limitations.

Keywords: Rhomboid Muscle Pain, Instrument-Assisted Soft Tissue Mobilization (IASTM),Maitland Mobilization, Conventional Physiotherapy, Pain Management, Visual Analog Scale (VAS),Numerical Pain Rating Scale (NPRS)

INTRODUCTION

Rhomboid Muscle Pain

Rhomboid muscle pain is an extremely common problem that can completely interfere with life. It is more often experienced as aching or stiffness in the upper back area, especially across the shoulder blades. The pain level can range

from mild to severe and also may affect one's posture, arm movements, and functionality altogether. Understanding its location, function, causes, and symptoms would be very necessary for its efficient management and treatment.

Rhomboid Muscles: Location and Function

The rhomboid muscles are found in the upper back, positioned between the spine and the inner edges of the shoulder blades. They play a vital role in the proper mechanics of the shoulders and good posture. There are two muscles that comprise the rhomboids:

- Rhomboid Major: The major muscle is the larger one which lies below the trapezius and spans from the upper thoracic vertebrae to the medial border of the scapula. - Rhomboid Minor: This minor muscle is above the rhomboid major. It connects the lower cervical vertebrae with the scapula.

The primary functions of the rhomboid muscles include scapular retraction, stabilization, and postural support. They pull the shoulder blades together, stabilize them during arm movements, and counteract forward-slouching tendencies, ensuring a balanced and upright posture.

Causes of Rhomboid Muscle Pain

Several factors contribute to rhomboid muscle pain, including strain, poor posture, direct injury, and muscle imbalances.

Strain or Injury: Overuse of the rhomboid muscles during repetitive motions, such as rowing or weightlifting, can result in pain. Sudden, intense exertion without adequate warm-up may also strain these muscles, leading to discomfort.

Poor Posture: Slouching or leaning forward for long periods, such as at a computer or on a phone, can cause overstretching and weakening of the rhomboids. This is often accompanied by rounded shoulders and a forward head posture, which worsens the condition.

Direct Injury: Accidents, falls, or impacts can directly damage the rhomboid muscles, causing localized pain and inflammation.

Muscle Imbalance: The imbalance may result in weakness in adjacent muscles like trapezius and rotator cuff; hence, it may lead to overcompensation of rhomboids, and the muscle suffers from fatigue and pain.

Symptoms of Pain in Rhomboid Muscles

Rhomboid muscle pain usually presents itself as a sense of discomfort localized in between the scapula; this pain is more often felt like an ache or a sharpness. The symptom usually worsens with activity especially when movements include the shoulder and arms. Stiffness in the upper back can reduce the range of motion, thereby causing discomfort and difficulties in carrying out daily tasks. Pain is usually accompanied by tenderness to pressure over the affected region and may also be felt as a feeling of tightness or presence of knots. Reaching overhead, lifting, or deep breathing exacerbates pain; thus, early treatment should be sought to reduce discomfort and accelerate recovery.

IASTM for Rhomboid Muscle Pain

Instrument-Assisted Soft Tissue Mobilization is a specialized form of manual therapy used to address soft tissue dysfunction, such as rhomboid muscle pain. This method involves the use of tools that have been designed to target specific areas of muscle tension, fascial restrictions, and scar tissue. Such tools are typically made from stainless steel, thus allowing practitioners to apply precise and consistent pressure on the affected areas. The rhomboid pain caused by poor posture, overuse, or strain can be managed through versatile solutions by IASTM that addresses issues like muscle tightness and adhesions. The main objectives of IASTM for rhomboid pain include the improvement of tissue mobility, reduction of pain, enhancement of blood flow, and remodeling of scar tissue.

It works by enhancing the flexibility and elasticity of the rhomboid muscles and the structures around them and reducing restrictions and stiffness. Breaking down adhesions and muscle knots further helps eliminate pain and discomfort. Improved blood flow enhances delivery of oxygen and nutrients to tissues, leading to faster healing and recovery. Individuals with scar tissues from previous injuries benefit from reorganization of those tissues through IASTM. The practitioner is able to apply smooth, rounded instruments in controlled strokes along the area of the rhomboids while treating. The pressure applied can vary according to comfort for the patient and to the severity of tissue dysfunction.

The procedure initiates with assessment. Determined areas of tension are marked. Preparing the area with a lubricant, such as lotion or oil, reduces skin friction. The instruments are used to pass over tight or restricted areas breaking adhesions and releasing tension. The practitioner will be continuously monitoring tissue quality, taking into consideration patient feedback for readjusting technique to provide both effective and comfortable treatment. Generally, patients will report an immediate sense of relief after IASTM, including reduction in pain and increase in range of motion as well as improvements in muscle flexibility. Muscle stiffness and fascial restrictions are addressed through this therapy to restore proper shoulder blade movement, which prevents secondary problems such as tension headaches or compensatory muscle imbalances. Improved blood flow from the session facilitates healing of the tissue, and release of muscle tension helps to bring relaxation and recovery. Although IASTM is generally safe, certain considerations must be taken into account. Patients with sensitive skin, open wounds, or conditions such as blood clotting disorders, fractures, or advanced osteoporosis should consult a healthcare provider before undergoing treatment. Post-treatment care involves light stretching, hydration, and, if necessary, applying ice to manage any mild soreness or redness. In conclusion, IASTM is an

effective therapy for managing rhomboid muscle pain by addressing underlying causes such as tissue restrictions and adhesions. When applied by a trained professional, this technique enhances recovery, relieves pain, and restores normal function. Proper assessment and a personalized approach ensure the best results for patients seeking relief from rhomboid discomfort.

Scapulothoracic Joint Mobilization Using the Maitland Technique

The scapulothoracic joint is a functional articulation that exists between the anterior surface of the scapula and the posterior thoracic wall. This joint is held together by muscles and connective tissues. This joint plays an important role in shoulder mechanics as well as upper limb functionality as a whole. The Maitland mobilization technique, a manual therapy approach developed by Geoffrey Maitland, can effectively address dysfunctions in this joint by improving mobility, reducing pain, and enhancing functional recovery. This technique focuses on rhythmic oscillatory movements tailored to the patient's specific condition, making it a patient-centered, evidence-based approach.

Maitland mobilizations for the scapulothoracic joint are graded into five categories, varying in amplitude and intensity. Grades I and II carry gentle oscillating movements used mainly for pain relief. Grades III and IV use larger and more forceful movements to increase joint mobility and to reduce stiffness. Grade V, high-velocity, low-amplitude thrust, is used for serious restrictions but exclusively by experienced practitioners. The versatility of these graded mobilizations ensures the treatment is both safe and effective for each patient.

The application of Maitland mobilization begins with a proper assessment to assess the mobility of the scapula, the pattern of pain, and muscular involvement. The patient is placed in a comfortable position, usually on the side or sitting, in which the access to the scapula is optimal and support to the thoracic region is maintained. The therapist performs rhythmic mobilizations in the form of elevation, depression, protraction, retraction, and upward or downward rotation of the scapula. These movements are critical in restoring normal scapulothoracic rhythm and general shoulder function. The therapist makes use of constant feedback from the patient to modify the technique and keep the patient comfortable throughout the session.

The benefits of scapulothoracic mobilization are numerous. It decreases pain by resolving joint restrictions and relaxing the tension in the surrounding soft tissues. The mobilization also returns normal scapular kinematics that are necessary for smooth shoulder movement. Enhanced scapular alignment also helps to rectify postural imbalances by reducing stress on associated structures and improving general posture. Moreover, the intervention aids functional recovery as it allows patients to perform daily activities with ease and comfort.

Although highly effective, scapulothoracic mobilization has contraindications. It should not be performed in cases of acute inflammation, severe pain, recent trauma or surgery, systemic infections, advanced osteoporosis, or malignancies in the region. Neurological symptoms such as tingling, numbness, or weakness also warrant further evaluation before considering mobilization.

The Maitland technique is a valuable intervention for addressing pain and dysfunction in the upper back and shoulder regions through scapulothoracic joint mobilization. Its evidence-based, patient-centered approach ensures targeted and safe outcomes, improving mobility, posture, and quality of life.

METHODOLOGY

1. Study Design:

The study will be a type of EXPERIMENTAL STUDY, which will compare the effects of Instrument Assisted Soft Tissue Mobilization (IASTM) combined with Maitland Scapulothoracic Joint Mobilization (MJSM) against a control group receiving standard care.

2. **Participants:**

Sample Size: A total of 30 participants will be recruited, aged 20-40 with diagnosed rhomboid muscle pain.

Inclusion Criteria:

I. Diagnosis of rhomboid muscle pain confirmed through clinical evaluation.
II. No history of trauma or surgery to the upper back in the last year.
III. Capable of giving consent and complying with the study protocols

Exclusion criteria:

I. Neurological deficits
II. Other musculoskeletal disorders that involve the upper back
III. Pregnant or receiving anticoagulant therapy

3. **Randomization:**

The participants will be randomly assigned to either the intervention group that will receive IASTM + Maitland mobilization or the control group that will receive conventional physiotherapy.

4. **Intervention Protocols:**

A. Intervention Group:
IASTM Technique
Common tools used are: Edge tool
Assessment:
Systematically evaluate the patient's presentation, including levels of pain, range of motion, and tenderness over the rhomboids.
Determine areas of soft tissue tension or tenderness in the regions around the rhomboids and upper back.
Setup:
Position the patient in an appropriate setting: seated or standing, where they can easily expose the upper back region.
Apply a small amount to the skin at the site targeted by the technique, allowing that area to diminish friction between tool and skin IASTM
Main areas around the scapula are medial scapular border, the scapular spine, the lateral border and the upper fibres of trapezius. Along the medial edge the direction of treatment is either from inferior to superior or superior to inferior. Along the scapular spine the direction of treatment is medial to lateral.

Post Treatment:
Evaluate the pain and the range of motion after the IASTM session to look at the immediate results.
Application of IASTM tools to the rhomboid and surrounding soft tissues to decrease pain and increase function.
Techniques will involve scraping and contouring along the muscle fibers to improve blood flow and aid in healing.

Maitland Scapulothoracic Joint Mobilization :
Passive mobilizations will be done on the scapula to enhance joint mechanics and to reduce discomfort.
Scapulothoracic Mobilization
The scapulothoracic articulation is not a true joint; it depends on surrounding soft tissues to allow normal shoulder girdle mobility.
Indications
This procedure is employed to promote scapular movements, such as:
Elevation
Depression
Protraction
Retraction
Rotation
Upward and downward rotation
Winging
Patient Position
If the patient has severe limitations in mobility, start with them in a prone position.
- Slowly progress to a side-lying position, with the patient facing you.
- Allow the patient's arm to drape freely over your lower arm to support its weight. This will help the patient relax the muscles of the scapula.
Hand Placement
Use your upper hand to stabilize the acromion process, guiding where the mobilization is directed.
- Use your inferior hand to scoop under the medial border and inferior angle of the scapula.
Mobilizing Force
- Apply a mobilizing force to move the scapula in a specific direction either by lifting the inferior angle or applying pressure at the acromion process.
Grades of mobilization (I-II) will be chosen based on individual assessment of pain and range of motion.
B. Control Group:
Involving some standard care will be education about posture and making ergonomic adjustments, with light stretching of the upper back.
Pain Relief Modalities

Heat Therapy:
Use of heat packs or ultrasound therapy to the upper back to increase blood flow, relax muscles, and decrease pain
Electrical Modalities:
Transcutaneous Electrical Nerve Stimulation (TENS): This can be used to decrease pain perception
Exercise Therapy

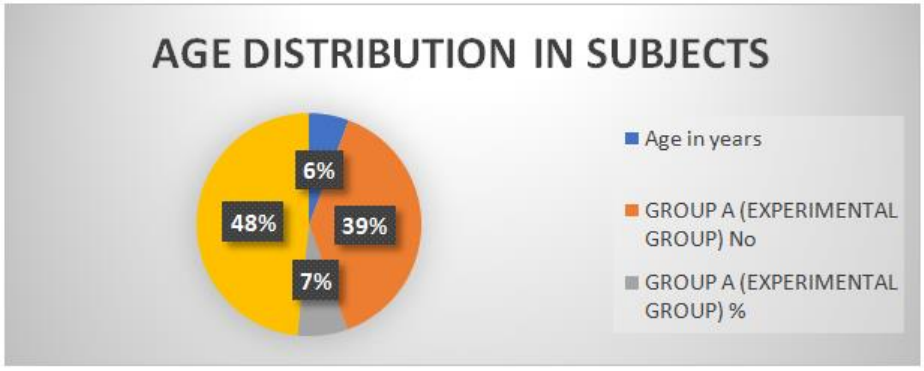
Stretching Exercises:
Gentle stretching of the rhomboid muscles, pectoral muscles, and surrounding soft tissues to increase flexibility and decrease tightness

Postural Exercises:
Stress to focus on exercises that promote correct posture, and include education such as chin tucks and wall angels to not overwork the rhomboids.

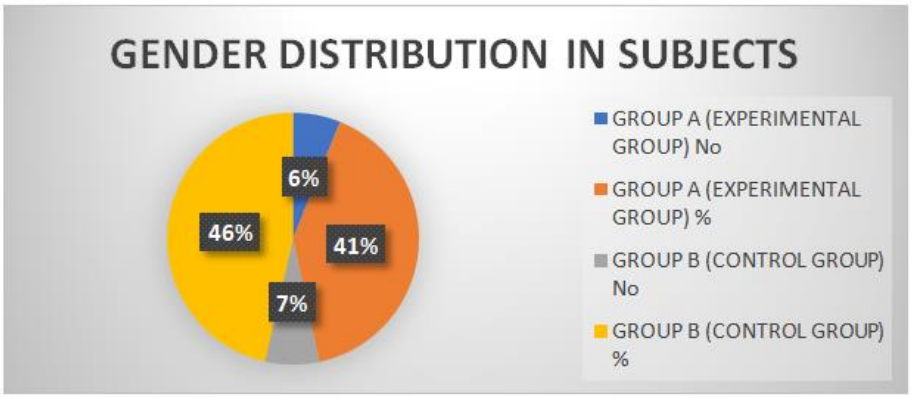
5. Outcome Measures
Pre- and post-outcome measures were assessed on treatment's first and last day. The total treatment sessions were 10 sessions, for 10 working days. The total duration of the study was 6 months.
The outcome measures were the Visual Analogue Scale and Numeric Pain Rating Scale.

RESULTS

AGE DISTRIBUTION IN SUBJECTS					
		GROUP A (EXPERIMENTAL GROUP)		GROUP B (CONTROL GROUP)	
S.No	Age in years	No	%	No	%
1	20-25	4	26.6	5	33.3
2	26-30	6	40	5	33.3
3	31-35	3	20	2	13.3
4	36-40	2	13.3	3	20
TOTAL		15	100%	15	100%
MEAN		3.75		3.75	
SD		1.479019946		1.299038106	

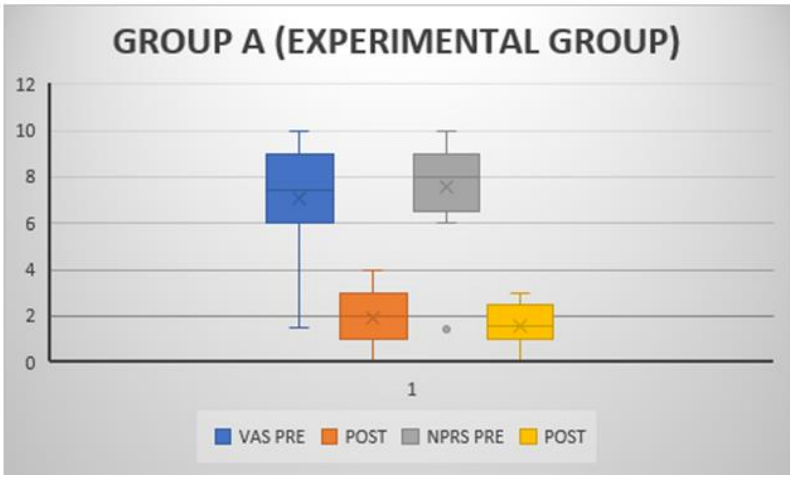


GENDER DISTRIBUTION IN SUBJECTS					
		GROUP A (EXPERIMENTAL GROUP)		GROUP B (CONTROL GROUP)	
S.No	Gender	No	%	No	%
1	MALE	7	46.6	8	53.3
2	FEMALE	8	53.3	7	46.6

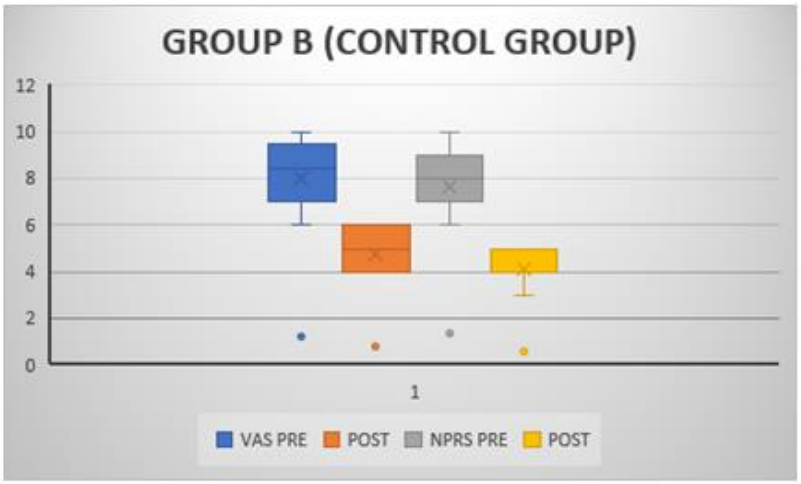


GROUP A (EXPERIMENTAL GROUP)

S.No	OUTCOME MEASURES	PRE TEST		POST TEST		PAIRED T- TEST	
		RANGE	MEAN ± SD	RANGE	MEAN ± SD	T-STAST	P VALUE
1	VAS	6-10	7.46 ± 1.54	0-4	2.0 ± 1.41	9.92	0.0000001003
2	NPRS	6-10	8.0 ± 1.41	0-3	1.6 ± 1.08	11.82	0.0000000114



GROUP B (CONTROL GROUP)							
S.No	OUTCOME MEASURES	PRE-TEST		POST TEST		PAIRED T- TEST	
		RANGE	MEAN ± SD	RANGE	MEAN ± SD	T-STAST	P VALUE
1	VAS	8-10	8.46 ± 1.25	4-6	5.0 ± 0.816	8.4	0.000000768
2	NPRS	6-10	8.06 ± 1.33	4-5	4.33 ± 0.59	16.33	0.00000000016



The results of the paired t-test show significant differences between the pre- and post-intervention values in both groups for VAS and NPRS. In Group A (Experimental Group), the VAS scores were highly significantly reduced, t-statistic = 9.92, p-value = 1.03 times 10^{-7}, indicating a large reduction in pain levels post-intervention. Similarly, NPRS scores also demonstrated a significant decrease (t-statistic = 11.82, p-value = 1.14 times 10^{-8}, indicating a significant decrease in the intensity of pain. The findings indicate that the intervention provided to Group A was highly effective in reducing both the levels and intensity of pain. In Group B (Control Group), also there was significant decrease in the VAS score (t-statistic = 8.40, p-value = 7.68 times 10^{-7} and NPRS scores (t-statistic = 16.36, p-value = 1.60 times 10^{-10}.

These studies confirm that interventions of the control group, namely conventional physiotherapy, were indeed useful in terms of pain control. However, on comparison with Group A, it seems that the improvement in levels and intensity of pain is lesser, indicating an added benefit for the combination of IASTM and Maitland mobilization over standard care alone. For this study, participants were divided into either Group A or Group B through random allocation to ensure minimal bias and balanced distribution. Group A received an integrated intervention of IASTM and Maitland mobilization to reduce pain and enhance joint function.

On the other hand, Group B was subjected to conventional physiotherapy, which was standard treatment modalities that were commonly applied for the management of pain and dysfunction. The VAS and NPRS were collected before and after the intervention for comparison. Overall, statistically significant improvements were evident in both groups, confirming that physiotherapy is indeed an effective modality for pain relief. Nonetheless, the significant declines in both Group A's mean pain level and intensity levels do indicate a possibility of the combined IASTM and Maitland mobilization approach being better than the control group. The inclusion of these interventions in the practice may yield greater benefits to pain patients with accompanying functional limitations.

DISCUSSION

The present research aimed to assess the efficiency of Instrument-Assisted Soft Tissue Mobilization (IASTM) in association with Maitland scapulothoracic joint mobilization in patients with rhomboid muscle pain compared to a conventional physiotherapy approach. The results clearly show that the two treatment approaches resulted in effective pain alleviation; the experimental group of patients, on the other hand, showed remarkable improvements in comparison to the actual pain levels and intensity as quantified by both the Visual Analog Scale (VAS) and the Numerical Pain Rating Scale (NPRS).

In Group A, the significant reductions in VAS scores, t-statistic = 9.92, p-value = 1.03 times 10^{-7}, and NPRS scores, t-statistic = 11.82, p-value = 1.14 times 10^{-8}, indicated that the IASTM combined with Maitland mobilization not only reduced pain but also improved the overall functional capacity of the scapulothoracic region. This concurs with some existing literature suggesting that IASTM is beneficial in promoting healing and pain relief within tissues through means such as increasing blood flow, reducing muscle spasm, and facilitating lymphatic drainage. The use of Maitland mobilization likely contributed synergistically by promoting joint mobility, which facilitates further relaxation of pain as a result of mechanoreceptor stimulation.

On the other hand, Group B, which was treated using conventional physiotherapy, also showed a significant difference with considerable diminutions in pain; VAS scores: t-statistic = 8.40, p-value = 7.68 times 10^{-7}, and NPRS: t-statistic = 16.36, p-value = 1.60times 10^{-10}. This clearly proves the pain managing efficacy of the usual physiotherapeutic treatments. However, less significant changes were noted in this group compared to Group A. This indicates that though conventional methods are useful, the combined approach using IASTM and Maitland mobilization is more effective.

The randomization of participants into two groups helped in reducing bias, as well as creating a balanced sample, which helped in increasing the reliability of the findings. The use of pre- and post-intervention measurements facilitated quantifying the impact of these interventions on levels of pain. Nonetheless, some limitations are noted. Although the sample size is adequate for initial findings, a small sample size may limit the generalizability of the results. Future studies with larger cohorts and diverse populations are recommended to confirm the above findings.

Long-term effects on pain control and function were not addressed in the study. Follow-up assessments are required to determine how long-term the pain relief and improvement in function would last. More research on this could clarify the specific mechanisms by which IASTM and Maitland mobilization interventions might work so that future evidence-based treatment protocols may be optimized.

In end, the results of this study indicate that the combination of IASTM and Maitland scapulothoracic joint mobilization is more effective than conventional physiotherapy alone in reducing rhomboid muscle pain. These techniques may, therefore, be added to clinical practice to enhance the treatment outcomes for patients with pain and functional impairments, which will lead to better pain management strategies.

CONCLUSION

The present study demonstrates that combining Instrument-Assisted Soft Tissue Mobilization (IASTM) with Maitland scapulothoracic joint mobilization is significantly more effective in reducing rhomboid muscle pain compared to conventional physiotherapy. The experimental group (Group A) exhibited greater reductions in pain levels and intensity, as measured by the Visual Analog Scale (VAS) and Numerical Pain Rating Scale (NPRS), underscoring the enhanced efficacy of this combined approach.

These findings highlight the potential of IASTM in promoting tissue healing and pain reduction through mechanisms such as improved circulation, decreased muscle tension, and enhanced lymphatic drainage. When complemented by Maitland mobilization, which improves joint mobility and activates pain-relieving mechanoreceptors, the combined intervention offers a synergistic effect that significantly surpasses the outcomes achieved through conventional physiotherapy alone.

While the study confirms the effectiveness of both treatment modalities, it underscores the superiority of the combined approach in managing rhomboid muscle pain and potentially improving the functional capacity of the scapulothoracic region. Incorporating these techniques into clinical practice may provide more comprehensive and effective pain management strategies for patients.

Future research with larger sample sizes and diverse populations is recommended to validate these findings and explore the long-term benefits of these interventions. Additionally, further studies should investigate the specific mechanisms underlying the observed improvements to refine and optimize treatment protocols.

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