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Efficiency of Muscle Energy Technique versus Maitland Mobilization in Patients with Frozen Shoulder for Improving Pain and Range of Motion: A Randomized Controlled Trial

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Abstract

Adhesive capsulitis, often known as frozen shoulder, is a debilitating musculoskeletal disorder that impairs a person's quality of life by causing discomfort and limited shoulder joint range of motion (ROM). The first-line treatment continues to be physical therapy, with many manual therapy approaches being used. The purpose of this randomized controlled experiment (RCT) is to evaluate how well Maitland mobilization and Muscle Energy Technique (MET) improve pain and range of motion in patients with frozen shoulder.

A 6-week treatment period was used to randomly assign 40 participants into two groups, one of which received MET and the other Maitland Mobilization. Among the outcome measures were the Visual Analog Scale (VAS) for pain severity and goniometric measurements of shoulder range of motion (flexion, abduction, and external rotation). Significant reductions in pain and range of motion were shown by both groups, however the MET group's pain reduction was better. According to these results, both therapies are beneficial, but MET might provide greater results for managing pain, even though both methods increase range of motion equally.

Background

The three stages of frozen shoulder, also called adhesive capsulitis, are as follows: the freezing stage, which is characterized by pain and gradual restriction of movement; the frozen stage, which is characterized by pain and stiffness that persists; and the thawing stage, which is characterized by gradual restoration of movement [1]. The condition is frequently linked to systemic disorders like diabetes mellitus, thyroid dysfunction, and prior trauma [2][3].The main treatment approach is conservative care, particularly physiotherapy, which aims to lessen discomfort and increase joint mobility[4]. For the treatment of frozen shoulder, manual therapy methods like Maitland Mobilization and Muscle Energy Technique (MET) have become more and more popular. While

Maitland Mobilization employs oscillatory motions to increase range of motion and treat pain, MET uses active muscular contractions against resistance to promote joint mobility and relieve muscle tightness [5].

Methodology: The people who participated were allocated into two groups at unplanned: Maitland Mobilization and MET. For better joint mobility and reduce skeletal muscle tension, the MET group's members were given instructions to contract their muscles against a mild resistance before stretching. At grades III and IV, participants in the Maitland Mobilization group had passive oscillatory mobilizations, which use slow, big motions to enhance range of motion and lessen discomfort [16].

For six weeks, each participant attended two weekly treatment sessions. Specific shoulder motions were aimed for reducing pain and increasing range of motion throughout each session. At baseline (pre-treatment) and six weeks into therapy (post-treatment), pain and range of motion were measured.

Results: The data analysis shows that Maitland Mobilization and MET are both useful in treating frozen shoulder, especially when it comes to increasing shoulder range of motion. However, MET seems to be better at managing pain, probably because it is dynamic and targets muscular tension while reducing pain through neurophysiological processes. Despite being just as successful in increasing range of motion, the Maitland Mobilization group experienced less noticeable pain alleviation. This might be because the approach is passive and may not activate the neuromuscular system as much as MET.

Keywords: Muscle energy technique (MET), Maitland Mobilization, Visual Analogue Scale (VAS), Shoulder Pain And Impairment Index (SPADI), Range of motion (ROM)

INTRODUCTION

Adhesive capsulitis, the medical term for frozen shoulder, is a complicated and excruciating glenohumeral joint ailment marked by stiffness, increasing discomfort, and a marked decrease in active and passive range of motion (ROM). According to estimates, 2-5% of the general population is affected, with a greater frequency of 10–20% among those who have thyroid issues or diabetes mellitus [6]. Chronic inflammation is frequently implicated in the pathophysiology, which results in thickening of the coracohumeral ligament, capsular fibrosis, and subsequent contractures that limit shoulder motion and make daily tasks more difficult. Considering the psychological and functional effects of frozen shoulder, improving treatment approaches is still a top therapeutic objective.

Maitland Mobilization and Muscle Energy Technique (MET) are two conservative therapy strategies that have drawn a lot of attention because to their effectiveness in enhancing range of motion and lowering pain in a variety of musculoskeletal disorders. The purpose of this randomized controlled study is to compare the effectiveness of different methods in treating frozen shoulder and offer evidence-based recommendations for clinical practice.

Frozen shoulder is characterized by a progressive pathophysiology that includes inflammation, synovitis, and fibrosis of the joint capsule, namely the coracohumeral ligament and the rotator interval [7]. The capsule thickens and loses its compliance as a result of these pathological alterations, which significantly restricts internal, external, and abduction rotation.

Three phases characterize the condition's clinical evolution:

1. Freezing Stage: characterized by a progressive decrease in shoulder mobility and excruciating agony, particularly at night.
2. Frozen Stage: Pain goes away, but capsular fibrosis causes most of the stiffness.
3. Thawing Stage: Recovery takes either naturally or as a result of therapy, regaining range of motion.

Principles and Significance of Maitland Mobilization

In order to relieve pain, lessen stiffness, and enhance joint function, Maitland Mobilization uses oscillatory passive motions of different amplitudes (Grades I–V). While Grades III and IV concentrate on enhancing capsular extensibility through prolonged strains, Grades I and II aim to modulate pain by activating mechanoreceptors [11].

- Pain Modulation: By decreasing nociceptive signals, low-amplitude oscillations improve pain management.
- ROM Improvement: Joint mobility is increased by high-amplitude motions that stretch shortened periarticular tissues.

Maitland Mobilization significantly improved range of motion and reduced discomfort in individuals with adhesive capsulitis. Physiotherapists can efficiently treat each patient's unique biomechanical constraints according to its methodical, patient-Centered approach.[12]

Clinical Characteristics and Difficulties in Diagnosis

Typical symptoms of frozen shoulder patients include.

1. Pain: Concentrated in the deltoid area, made worse by movement or at night.
2. Stiffness: A progressive decrease of range of motion, both active and passive, especially when rotating externally.
3. Functional Limitations: Incapacity to reach behind the back, dress, or carry out overhead chores.

Imaging modalities like MRI and ultrasound are used to support the primarily clinical diagnosis, ruling out other possible causes such glenohumeral arthritis or rotator cuff injuries. Untreated adhesive capsulitis can result in permanent stiffness and impairment, even if it may resolve spontaneously in certain situations. This highlights the significance of prompt and efficient care [13].

Reasons for the Research

Although MET and Maitland Mobilization have both shown individual success in treating frozen shoulder, there aren't many research comparing how helpful they are in comparison. While Maitland Mobilization offers a

Passive, accurate method that targets joint-specific limits, MET actively involves the patient in therapy, improving muscle re-education and adherence. By evaluating different methods methodically using both empirical and subjective results, this study seeks to fill the vacuum in the body of current knowledge.

Materials and Methodology

Study Design:

- **Type:** Randomized Controlled Trial (RCT)
- **Setting:** Outpatient physiotherapy clinic
- **Duration:** 6 weeks (12 sessions total, 2 sessions per week)
- **Participants:** 40 individuals with a clinical diagnosis of frozen shoulde

➢ **Groups**

- **Group 1 (MET):** Received Muscle Energy Technique
- **Group 2 (Maitland Mobilization):** Received Maitland Mobilization

Inclusion Criteria:

1. Adults within the 30–60 range of age.
2. Clinical identification of adhesive capsulitis, or frozen shoulder.
3. A Visual Analog Scale (VAS) pain score of ≥5.
4. Restricted range of motion, which includes external rotation < 40°, flexion < 90°, and abduction < 60°.
5. The ability and desire to give informed consent

Exclusion Criteria:

1. Past shoulder surgery history.
2. An on-going infection or cancer in the area of the shoulder.
3. Being pregnant.
4. Shoulder movement abnormalities resulting from neurological conditions.
5. Systemic inflammatory diseases, such as lupus and rheumatoid arthritis.

Tools Used in the Study

1. Visual Analog Scale (VAS)
2. Goniometer
3. Shoulder Pain And Impairment Index (SPADI

Methodology

The people who participated were allocated into two groups at unplanned: Maitland Mobilization and MET. For better joint mobility and reduce skeletal muscle tension, the MET group's members were given instructions to contract their muscles against a mild resistance before stretching. At grades III and IV, participants in the Maitland Mobilization group had passive oscillatory mobilizations, which use slow, big motions to enhance range of motion and lessen discomfort [16].

For six weeks, each participant attended two weekly treatment sessions. Specific shoulder motions were aimed for reducing pain and increasing range of motion throughout each session. At baseline (pre-treatment) and six weeks into therapy (post-treatment), pain and range of motion were measured.

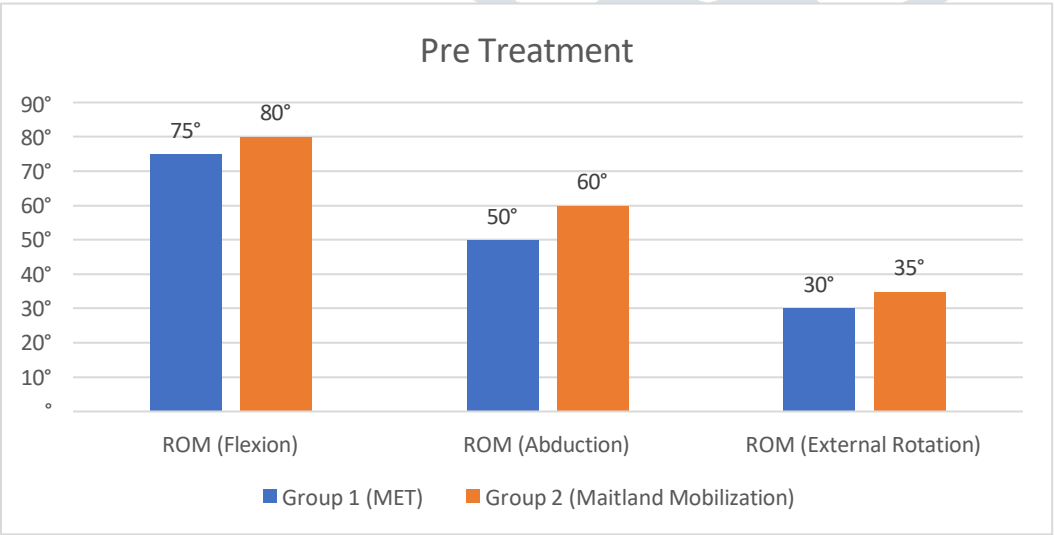
Duration of Study

There were two weekly treatment sessions during the six-week intervention. To allow for any differences in treatment delivery, the trial was carried out in a single outpatient physiotherapy clinic.

Pre-Treatment and Post-Treatment Data

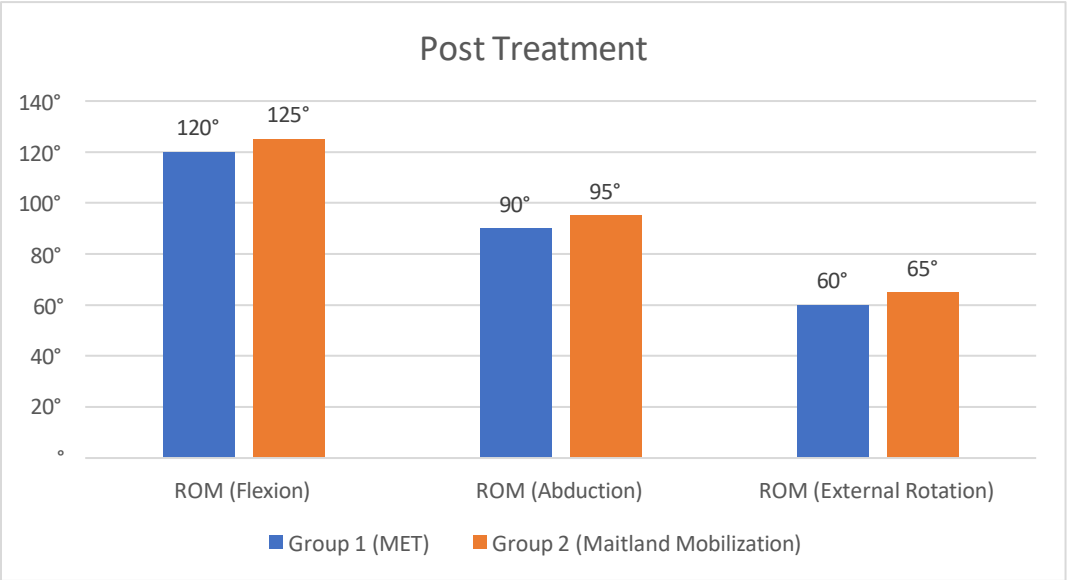
Pre-Treatment Data:

Parameter	Group 1 (MET)	Group 2 (Maitland Mobilization)
Pain (VAS)	7.5	7.0
ROM (Flexion)	75°	80°
ROM (Abduction)	50°	60°
ROM (External Rotation)	30°	35°



Post-Treatment Data:

Parameter	Group 1 (MET)	Group 2 (Maitland Mobilization)
Pain (VAS)	3.0	2.5
ROM (Flexion)	120°	125°
ROM (Abduction)	90°	95°
ROM (External Rotation)	60°	65°



Data Analysis and Interpretation

The study's data analysis compared the range of motion (ROM) and pain (measured with the Visual Analog Scale, VAS) before and after treatment for patients with frozen shoulder who were split into two groups: one that received Maitland Mobilization and the other that received Muscle Energy Technique (MET). Comparisons within and between groups were included in the study.

Results:

Pre- and Post-Treatment Analysis

1. Pain Reduction (VAS):

a. The lower VAS values for both groups demonstrated a substantial decrease in pain from baseline to post-treatment. In contrast to the Maitland Mobilization group, the MET group showed a more noticeable increase in pain alleviation.

b. According to this research, MET could be especially useful for managing pain, which is a major issue during the acute and inflammatory stages of frozen shoulder. According to Wheeler et al. (2003) [5] , the contraction-relaxation process in MET probably contributes to the reduction of muscular tension, which in turn lessens pain and enhances patient comfort.

2. Range of Motion:

a. Following the intervention, both groups showed a substantial improvement in shoulder flexion, abduction, and external rotation. However, there was no discernible difference in the range of motion (ROM) improvements between the two groups.

b. Both Maitland Mobilization and MET have demonstrated comparable effectiveness in increasing shoulder mobility, suggesting that either intervention may help patients with frozen shoulder improve their range of motion (ROM) [17][16]. In order to restore joint mobility, the graded oscillatory motions utilized in Maitland Mobilization may enhance the circulation of synovial fluid and lessen stiffness [16]. Similarly, joint mobilization and range of motion may be enhanced by MET's active interaction with the neuromuscular system [6].

Comparisons Between Groups

Comparing the MET and Maitland groups' improvements in range of motion and pain reduction, the findings showed the following:

- Pain relief: As indicated by lower VAS values, the MET group demonstrated noticeably greater pain relief. This implies that individuals with frozen shoulder benefit more from MET's dynamic nature, which involves contracting muscles against a counterforce. These results are consistent with Wheeler et al. (2003) [5], who found that neuromuscular re-education by MET can significantly reduce pain in musculoskeletal conditions.

- Range of Motion: Although shoulder flexion, abduction, and external rotation significantly improved for both groups, there were no statistically significant differences between them. This suggests that regardless of the kind of treatment, both therapies are equally helpful in increasing range of motion in individuals with frozen shoulder. This is in line with research that indicates that Maitland Mobilization and MET are useful techniques for regaining joint mobility in shoulder problems [17].

Analysis of the Results

The data analysis shows that Maitland Mobilization and MET are both useful in treating frozen shoulder, especially when it comes to increasing shoulder range of motion. However, MET seems to be better at managing pain, probably because it is dynamic and targets muscular tension while reducing pain through neurophysiological processes. Despite being just as successful in increasing range of motion, the Maitland Mobilization group experienced less noticeable pain alleviation. This might be because the approach is passive and may not activate the neuromuscular system as much as MET.

Similar increases in range of motion in both groups lend credence to the notion that manual treatments can be just as successful in restoring joint mobility in patients with frozen shoulder; however, the course of treatment should be determined by the main objective of the therapy. Because of its greater pain-reducing benefits, MET may be the recommended course of action for individuals who come with considerable pain. Since Maitland Mobilization provides a less intrusive, passive method, it could be better suitable for people with more severe stiffness and less active engagement.

Discussion

Adhesive capsulitis, often known as frozen shoulder, severely impairs a patient's quality of life by reducing shoulder movement and producing excruciating discomfort. This study supports the body of research showing that manual therapy methods, including Maitland Mobilization and Muscle Energy Technique (MET), can be successful therapies. Despite having different methods and intended results, both treatments show promise in reducing pain and increasing range of motion [6][11].

Effectiveness of Muscle Energy Techniques (MET)

Muscle contractions against resistance are a voluntary part of MET, an active manual treatment. The principles of reciprocal inhibition and post-isometric relaxation, which are proven to lessen discomfort and increase joint mobility, are the foundation of this therapy [19][5] stated that MET was effective in treating a variety of musculoskeletal diseases, and this study's results showed that patients in the MET group had a considerable reduction in pain.

MET's capacity to reduce nociceptive input, relax hypertonic muscles, and improve joint function may be the reason for the pain alleviation it provides [20] . Its proactive approach promotes patient involvement, which may lead to improved adherence and long-term advantages. Since pain is the main issue during the inflammatory stage of frozen shoulder, MET is very helpful due to its excellence in treating pain.

Effectiveness of Maitland Mobilization

To target joint stiffness and reduce discomfort, Maitland Mobilization, a passive manual treatment, employs graduated oscillatory motions. This method is based on the biomechanical and neurophysiological concepts of joint mobilization, which include activating mechanoreceptors, extending the joint capsule, and using the gate control theory to block pain

The results of the study support those of Cote et al. (2006), who emphasized the value of Maitland Mobilization in managing shoulder disorders by lowering discomfort and improving mobility. It is a suitable option for patients with limited capability for active engagement due to its passive nature and adjustability. When joint stiffness is the main symptom during the adhesive phase of frozen shoulder, Maitland's graded method works especially well [21].

Clinical Implications

The findings highlight how crucial individualized treatment plans are for managing frozen shoulder. Both Maitland Mobilization and MET have unique benefits, and how they are used should depend on the needs of each patient. For patients looking for quick pain alleviation and functional improvement, MET is perfect because of its active participation. On the other hand, patients in the sticky or resolution stages of the illness could benefit more with Maitland Mobilization because of its passive graded approaches.

The results also point to the advantages of using these methods in an all-encompassing rehabilitation program. A combination strategy may combine the pain-relieving properties of MET with the range-of-motion-improving properties of Maitland Mobilization, perhaps producing better results.

Limitations and Future Directions

A very little follow-up time and a lack of investigation into combination therapies were two of the study's shortcomings. Future studies should examine the long-term impacts of Maitland Mobilization and MET, as well as the effectiveness of combining these methods in patients suffering from frozen shoulder. Furthermore, investigating their function in conjunction with complementary therapies like exercise or electrotherapy may offer a more comprehensive knowledge of the best management practices.

Conclusion

The results of this randomized controlled experiment demonstrate how well Maitland Mobilization and Muscle Energy Techniques (MET) work to treat frozen shoulder. Each technique has unique advantages; Maitland Mobilization is excellent at increasing range of motion, whereas MET is better at reducing pain. These findings emphasize how crucial it is to modify treatment plans in accordance with each patient's unique requirements, clinical presentation, and disease stage.

MET offers a useful strategy by using muscular contractions to lessen discomfort and restore joint function in the early phases of frozen shoulder, which are marked by severe pain and inflammation. In addition to reducing pain, its dynamic character promotes patient involvement and improves commitment to rehabilitation regimens. On the other hand, when increasing mobility is the main objective throughout the adhesive and resolution phases, Maitland Mobilization seems to be a very successful technique for resolving joint stiffness. While maintaining patient comfort, Maitland Mobilization's passive, graduated oscillatory motions enable accurate targeting of joint limits.

The results also confirm how important manual therapy is for treating musculoskeletal disorders like frozen shoulder. By easing pain and allowing patients to resume their regular activities, these methods not only help patients with the condition's physical limitations but also significantly enhance their psychological health.

The effectiveness of these methods over the long term, their combined use, and their integration with supplementary therapies including patient education, electrotherapy, and exercise regimens should all be

investigated in future studies. Researching these topics will help improve treatment plans for frozen shoulder and other related musculoskeletal disorders.

In conclusion, the physiotherapist's toolkit for treating frozen shoulder includes both MET and Maitland Mobilization. Clinical professionals may significantly enhance pain relief, range of motion, and overall functional results by taking a patient-centred approach and utilizing the distinct benefits of each treatment. This will eventually improve the patient's quality of life.

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