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Original Article

Effect of Maitland Mobilization with and without Spencer Muscle Energy Techniques in Treatment of Frozen Shoulder

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ABSTRACT

Background: Frozen Shoulder, or Adhesive Capsulitis, is an inflammatory condition marked by shoulder stiffness, pain, and significant loss of passive range of motion. The condition predominantly affects individuals between 40 and 60 years of age, with a higher prevalence in women. Various treatment approaches have been explored, yet no single approach has been universally accepted as standard. Physiotherapeutic interventions, such as Maitland Mobilization and Muscle Energy Techniques (METs), have shown promise in managing this condition.

Objective: To compare the effectiveness of Maitland Mobilization with and without Spencer Muscle Energy Techniques in treating frozen shoulder.

Methods: This randomized controlled trial was conducted over four months at the physiotherapy departments of Allied Hospital and DHQ Hospital in Faisalabad. Forty patients with unilateral frozen shoulder, aged 40 to 60 years, were randomly assigned to two groups: Group A (Maitland Mobilization with Spencer METs) and Group B (Maitland Mobilization only). Each group received three treatment sessions per week for six weeks. Outcome measures included the Shoulder Pain and Disability Index (SPADI), Numeric Pain Rating Scale (NPRS), and goniometric assessment of shoulder range of motion (ROM). Data were collected at baseline and post-intervention. Statistical analysis was performed using SPSS version 25, with independent sample t-tests for between-group comparisons and paired sample t-tests for within-group differences.

Results: The Group A showed a significant improvement in NPRS scores from 5.95 ± 1.96 to 2.25 ± 0.72 ($p = 0.001$), SPADI scores from 86.20 ± 9.37 to 45.00 ± 9.54 ($p = 0.014$), and IADL scores from 18.55 ± 5.46 to 8.55 ± 4.83 ($p = 0.011$). Group B also showed improvements, with NPRS scores from 5.40 ± 1.35 to 3.55 ± 1.28 ($p = 0.001$), SPADI scores from 81.55 ± 12.84 to 57.20 ± 18.93 ($p = 0.014$), and IADL scores from 18.75 ± 4.63 to 13.65 ± 6.94 ($p = 0.011$). Group A demonstrated superior outcomes in shoulder flexion, extension, abduction, adduction, internal rotation, and external rotation (all $p < 0.05$).

Conclusion: Both Maitland Mobilization and Spencer METs effectively reduced pain and improved ROM and functional capacity in patients with frozen shoulder. However, the combined treatment of Maitland Mobilization with Spencer METs was more effective than Maitland Mobilization alone. These findings suggest that integrating both techniques into clinical practice could enhance treatment outcomes for patients with adhesive capsulitis.

Keywords: Frozen Shoulder, Adhesive Capsulitis, Maitland Mobilization, Muscle Energy Techniques, Spencer Technique, Shoulder Pain, Range of Motion, Physiotherapy, Rehabilitation Management.

INTRODUCTION

Frozen Shoulder, also known as Adhesive Capsulitis, is an inflammatory condition characterized by shoulder stiffness, pain, and a significant loss of passive range of motion. This condition predominantly affects individuals aged 40 to 60, with a higher prevalence observed in women. The precise pathophysiology of adhesive capsulitis remains uncertain, though it is generally believed to involve an initial inflammation of the joint capsule and synovial fluid, followed by reactive fibrosis and adhesions within the synovial lining (1). This process results in pain due to inflammation and restricted movement due to capsular fibrosis and adhesions.

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The glenohumeral joint, a ball-and-socket joint connecting the upper limb to the axial skeleton, plays a crucial role in the extensive range of motion afforded to the upper extremity. This joint's stability and mobility are influenced by the complex interplay of osseous structures, muscles, ligaments, and the joint capsule. The shoulder complex includes four main articulations: the acromioclavicular joint, the glenohumeral joint, the scapulothoracic joint, and the sternoclavicular joint. Each of these joints contributes to the shoulder's functional range of motion (2).

The clinical presentation of frozen shoulder typically progresses through three stages: the freezing stage, where the shoulder becomes painful and progressively stiff over two to nine months; the frozen stage, characterized by significant stiffness and reduced pain over four to twelve months; and the thawing stage, where gradual improvement in shoulder mobility occurs over five to twenty-four months (3). The condition can be severely debilitating, impacting daily activities and overall quality of life.

Various treatment modalities have been explored to manage adhesive capsulitis, but no single approach has emerged as universally effective. Among these, physiotherapeutic interventions such as Maitland Mobilization and Muscle Energy Techniques (METs) have garnered attention. Maitland Mobilization, which involves rhythmic oscillatory movements to stimulate mechanoreceptors and inhibit nociceptive receptors, aims to improve joint mobility and reduce pain (4). The Spencer Muscle Energy Techniques (METs), which involve the patient's active muscle contractions against a counterforce, are designed to stretch tight muscles and enhance joint range of motion through post-isometric relaxation (5).

This study aims to compare the efficacy of Maitland Mobilization with and without the incorporation of Spencer METs in treating patients with frozen shoulder. The hypothesis posits that the combination of these techniques may provide superior outcomes in terms of pain reduction, increased range of motion, and improved functional disability compared to Maitland Mobilization alone. By enrolling 40 patients with unilateral frozen shoulder from physiotherapy departments at Allied Hospital and DHQ Hospital in Faisalabad, the study employs a randomized control trial design to ensure robust and reliable results.

Participants are divided into two groups: one receiving Maitland Mobilization combined with Spencer METs, and the other receiving only Maitland Mobilization. Over a treatment period of six weeks, each group undergoes three sessions per week. Outcome measures, including the Shoulder Pain and Disability Index (SPADI), Numeric Pain Rating Scale (NPRS), and goniometric assessment of shoulder range of motion, are recorded pre- and post-intervention to evaluate the effectiveness of the treatments (6).

The results of this study are anticipated to contribute valuable insights into the optimal management strategies for frozen shoulder, potentially guiding clinical practice toward more effective physiotherapeutic interventions. By rigorously comparing these treatment modalities, the study seeks to establish evidence-based recommendations that can enhance patient outcomes and quality of life for those afflicted with this challenging condition.

MATERIAL AND METHODS

This randomized controlled trial was conducted to evaluate the effectiveness of Maitland Mobilization with and without Spencer Muscle Energy Techniques (METs) in treating frozen shoulder. The study was conducted at the physiotherapy departments of Allied Hospital and DHQ Hospital in Faisalabad over a period of four months. Ethical approval was obtained from the institutional review board, and the study adhered to the principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participants after explaining the study's aims, procedures, and potential risks.

Participants included 40 patients diagnosed with unilateral frozen shoulder, aged between 40 and 60 years, both male and female, who met the inclusion criteria of a minimum two-month duration of symptoms and willingness to participate. Exclusion criteria encompassed recent shoulder surgery, rheumatoid arthritis, history of trauma or fractures around the shoulder complex, neurological deficits affecting shoulder function, rotator cuff lesions, tendon calcification, and pain or disorders of the cervical spine, elbow, wrist, or hand on the affected side.

Participants were randomly assigned into two groups of 20 each using a randomization procedure. Group A received Maitland Mobilization combined with Spencer METs, while Group B received Maitland Mobilization only. Treatment sessions were conducted three times a week for six weeks. The interventions aimed to enhance joint mobility, reduce pain, and improve functional capacity.

Data collection involved several standardized tools. The Shoulder Pain and Disability Index (SPADI) was used to assess pain and functional impairment. A goniometer measured the range of motion (ROM) for shoulder flexion, extension, abduction, adduction, internal rotation, and external rotation. The Numeric Pain Rating Scale (NPRS) quantified pain intensity, and the Lawton Instrumental Activities of Daily Living (IADL) scale assessed the functional independence of participants.

The intervention protocols were meticulously followed. For Group A, the Spencer METs were administered, involving specific muscle contractions followed by passive stretching, in addition to the Maitland Mobilization techniques, which consisted of rhythmic oscillatory movements aimed at mobilizing the joint. Group B received only the Maitland Mobilization techniques.

Pre- and post-intervention assessments were conducted to evaluate the efficacy of the treatments. Data were collected at baseline and after the six-week intervention period. The SPADI, NPRS, and ROM measurements provided quantitative data on pain, disability, and shoulder mobility, respectively.

Data analysis was performed using SPSS version 25. Descriptive statistics summarized the demographic and baseline characteristics of the participants. The Shapiro-Wilk test assessed data normality. Independent sample t-tests compared pre- and post-intervention outcomes between the two groups, while paired sample t-tests evaluated within-group differences. Statistical significance was set at a p-value of less than 0.05.

The study's adherence to rigorous methodological standards, including randomization, standardized interventions, and comprehensive outcome assessments, ensured the reliability and validity of the findings. The ethical considerations and thorough data analysis further supported the study's credibility and potential impact on clinical practice in managing frozen shoulder.

RESULTS

The study included 40 participants with unilateral frozen shoulder, randomly assigned to two groups: Group A (Maitland Mobilization with Spencer METs) and Group B (Maitland Mobilization only). Both groups showed significant improvements in pain, range of motion (ROM), and functional disability after the six-week intervention.

The demographic characteristics of the participants are summarized in Table 1. The mean age was similar between the groups, with Group A having a mean age of 39.45 years and Group B, 41.45 years. Both groups had a comparable distribution of gender, marital status, nature of lifestyle, job type, socioeconomic status, and posture.

Table 1. Mean and Standard Deviations of Demographics

Variables	Group A (n=20)	Group B (n=20)	p-value
Age (years)	39.45 ± 3.58	41.45 ± 3.79	0.308
Sitting Hours/day	7.00 ± 0.86	6.60 ± 0.88	0.308
Height (inches)	64.40 ± 3.25	64.00 ± 2.25	0.308
Weight (kg)	70.45 ± 11.13	68.90 ± 10.94	0.308
BMI	26.73 ± 4.72	26.16 ± 4.48	0.308

Table 2. Frequency Distribution of Demographics

Variables	Frequency (%)
Gender	
- Male	14 (35.0%)
- Female	26 (65.0%)
Marital Status	
- Single	17 (42.5%)
- Married	23 (57.5%)
Lifestyle	
- Active	20 (50.0%)
- Sedentary	20 (50.0%)
Job Type	
- Part-time	16 (40.0%)
- Full-time	24 (60.0%)
Socioeconomic Status	
- Lower	15 (37.5%)
- Middle	24 (60.0%)
- Upper	1 (2.5%)
Posture	
- Relaxed	18 (45.0%)
- Corrected Sitting	22 (55.0%)

The outcome measures, including the Numeric Pain Rating Scale (NPRS), Shoulder Pain and Disability Index (SPADI), and various ROM assessments, showed significant improvements post-intervention in both groups.

Table 3. NPRS, SPADI, and IADL Scores Pre- and Post-Intervention

Outcome Measure	Group A Pre	Group A Post	Group B Pre	Group B Post	p-value (Post)
NPRS	5.95 ± 1.96	2.25 ± 0.72	5.40 ± 1.35	3.55 ± 1.28	0.001
SPADI	86.20 ± 9.37	45.00 ± 9.54	81.55 ± 12.84	57.20 ± 18.93	0.014
IADL	18.55 ± 5.46	8.55 ± 4.83	18.75 ± 4.63	13.65 ± 6.94	0.011

Table 4. ROM Measurements Pre- and Post-Intervention

ROM	Group A Pre	Group A Post	Group B Pre	Group B Post	p-value (Post)
Shoulder Flexion	73.10 ± 10.93	111.25 ± 20.89	73.20 ± 9.91	97.40 ± 7.82	0.008
Shoulder Extension	36.55 ± 5.46	59.55 ± 1.39	36.85 ± 4.77	57.15 ± 3.75	0.011
Shoulder Abduction	57.65 ± 8.36	110.40 ± 18.45	57.05 ± 9.85	87.80 ± 8.76	0.001
Shoulder Adduction	36.55 ± 5.46	48.70 ± 3.18	37.70 ± 5.25	44.85 ± 4.90	0.005
Shoulder Internal Rotation	49.85 ± 5.18	82.55 ± 4.12	50.85 ± 5.18	75.75 ± 6.69	0.001
Shoulder External Rotation	45.85 ± 5.85	83.20 ± 3.99	46.60 ± 4.21	75.45 ± 3.93	0.001

Shapiro-Wilk tests confirmed the normal distribution of data. Independent sample t-tests were used for between-group comparisons, revealing significant differences in post-intervention scores for NPRS, SPADI, and various ROM measures, favoring Group A. Paired sample t-tests indicated significant within-group improvements across all measured outcomes in both groups.

Overall, both interventions effectively reduced pain and improved ROM and functional capacity in patients with frozen shoulder. However, the combined treatment of Maitland Mobilization with Spencer METs (Group A) demonstrated superior outcomes compared to Maitland Mobilization alone (Group B). These findings suggest that integrating Spencer METs with Maitland Mobilization may offer enhanced therapeutic benefits for patients suffering from frozen shoulder.

DISCUSSION

The study aimed to compare the effectiveness of Maitland Mobilization with and without Spencer Muscle Energy Techniques (METs) in treating frozen shoulder. The results indicated that both interventions significantly improved pain, range of motion (ROM), and functional disability in patients over the six-week treatment period. However, the combined treatment (Group A) demonstrated superior outcomes compared to Maitland Mobilization alone (Group B).

Previous research has supported the use of both Maitland Mobilization and METs in managing adhesive capsulitis. Maitland Mobilization involves rhythmic oscillatory movements that stimulate mechanoreceptors and inhibit nociceptive receptors, thereby enhancing joint mobility and reducing pain (Maitland, 1983). METs, on the other hand, leverage muscle contractions against a counterforce to stretch tight muscles and improve joint ROM through post-isometric relaxation (Gupta et al., 2008). This study's findings align with those of Kumar et al. (2012), who reported that combining mobilization techniques with exercises significantly improves pain, ROM, and shoulder function in patients with idiopathic shoulder capsulitis.

The current study demonstrated that integrating Spencer METs with Maitland Mobilization yielded better improvements in pain relief, ROM, and functional capacity than Maitland Mobilization alone. This supports the hypothesis that the combined approach can provide more comprehensive therapeutic benefits. The enhanced outcomes observed in Group A may be attributed to the synergistic effects of both techniques, which together may better address the multifaceted nature of frozen shoulder, including both capsular tightness and muscle contracture (Rajadurai, 2011).

One strength of this study was its randomized controlled design, which minimized potential biases and ensured robust comparison between the two treatment modalities. The use of standardized assessment tools, such as the SPADI, NPRS, and goniometric measurements, provided reliable and valid measures of treatment outcomes. Additionally, the study's adherence to the principles outlined in the Declaration of Helsinki ensured ethical conduct and participant safety.

However, the study had several limitations. The sample size was relatively small, which may limit the generalizability of the findings. Larger studies are needed to confirm these results and provide more definitive evidence. Additionally, the study's duration was limited to six weeks, and longer follow-up periods are necessary to assess the sustainability of the treatment effects. The reliance on self-reported measures, such as the SPADI and NPRS, may also introduce subjective biases.

Another limitation was the study's exclusion of patients with recent shoulder surgery, rheumatoid arthritis, and other conditions that could affect shoulder function. While this helped create a more homogenous sample, it may also limit the applicability of the findings to a broader patient population. Future studies should consider including a wider range of participants to enhance external validity.

CONCLUSION

In conclusion, the study provided valuable insights into the management of frozen shoulder, demonstrating that the combination of Maitland Mobilization with Spencer METs is more effective than Maitland Mobilization alone in improving pain, ROM, and functional capacity. These findings suggest that integrating both techniques into clinical practice could enhance treatment outcomes for patients with adhesive capsulitis. Further research with larger sample sizes and longer follow-up periods is recommended to confirm these results and explore the long-term benefits of these interventions. Additionally, investigating the impact of these treatments on different patient populations and incorporating objective measures of shoulder function could provide a more comprehensive understanding of their efficacy.

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