

# Comparative Evaluation of Muscle Energy Technique and Maitland Mobilization Technique on Functional Activity, Motion Range, and Pain in Subjects with Adhesive Capsulitis

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## ABSTRACT

**Background:** Adhesive capsulitis is a well-known disorder associated with progressive stiffness and pain in the shoulder with unknown etiology or because of fibroblastic proliferation in coraco-humeral ligament and rotator interval anterior capsules needs to be checked.

**Objective:** The present study was conducted to comparatively evaluate the efficacy of the Maitland mobilization technique to muscle energy technique on functional activity, motion range, and pain in subjects with adhesive capsulitis.

**Method and Subjects:** In 26 subjects in the age range of 38-64 years were included and randomly divided into two groups of 13 subjects each were the group I was treated with Maitland mobilization technique and group II with muscle energy technique for 2 weeks. Functional activities were assessed with SPADI, for all shoulders ROM by goniometer, and pre and post pain scores by NPRS. The collected data were subjected to statistical evaluation and the results were formulated.

**Results:** Significantly better and comparable results were seen with the Maitland mobilization technique and muscle energy technique ( $p < 0.001$ ) concerning shoulder pain, range of motion, and disability index scores in subjects with adhesive capsulitis. On assessing the data and on the intergroup comparison, statistically insignificant clinical improvement was seen ( $p > 0.05$ ) for all assessed parameters.

**Conclusion:** The present study concludes that Muscle Energy Technique, as well as Maitland Mobilization Technique, had a better effect on improving functional activities, range of motion, and pain. However, the intergroup comparison showed statistically non-significant results.

**Key Words:** Adhesive Capsulitis, Maitland Mobilization Technique, Muscle Energy Technique, Numerical Pain Rating Scale, Range of Motion

**Tob Regul Sci.™ 2022; 8(1): 848-853**

**DOI: doi.org/10.18001/TRS.8.1.71**

## INTRODUCTION

Adhesive capsulitis is a well-known disorder associated with progressive stiffness and pain in the shoulder with unknown etiology or because of fibroblastic proliferation in correct-humeral ligament and rotator interval anterior capsules needs to be checked. The incidence of adhesive capsulitis ranges from 3-5% in the general population yearly to 20% in the diabetics. The incidence of adhesive capsulitis is more common in females compared to males and is usually seen in the 4<sup>th</sup> and 6<sup>th</sup> decades of life. Adhesive capsulitis was first described in 1896 by Duplay and was termed as peri arthritis scapula humeral which was identified as a lesion affecting periarticular structures.<sup>1</sup>

Adhesive capsulitis term was coined by Nevasier and he described this entity as thickened and contracted joint capsule which is tightly drawn around the head of the humerus with chronic inflammatory changes and absence of synovial fluid with synovial capsule layer. These restrictions in the movement in all the planes with no radiologic abnormality. Pain during both passive and active movements in affected subjects is restricted and painful with abduction and external rotation with maximum limitation.<sup>2</sup>

The etiology for adhesive capsulitis is unclear and can be classified as secondary or primary. The primary frozen shoulder is an idiopathic condition, whereas, secondary frozen shoulder is considered secondary to the surgical event or after known cause. Frozen shoulder has three subcategories including systemic including Diabetes mellitus and other metabolic conditions, intrinsic with factors like arthritis, Acromioclavicular joint, calcific tendonitis, biceps tendonitis, and rotator cuff and capsule pathologies, and extrinsic including Parkinson's disease, humerus fractures, Cerebrovascular accident, cervical disc disease, and cardiopulmonary disease.<sup>3</sup>

Adhesive capsulitis affects coraco-humeral ligament, maxillary recess, and anterosuperior joint capsule. Arthroscopy has shown that these subjects have no actual adhesions, mild/moderate synovitis, tight anterior capsule, and small joint space with no axillary fold. Rotator cuff interval contracture is also seen in these subjects that lead to decreased motion range. Three phases of adhesive capsulitis are the painful phase from 3-9 months, stiffening phase lasting for 4 to 12 months, and Thawing phase that can last up to 1-3.5 years. In phase II, free shoulder movement is not allowed due to the contracted capsule causing scapula movement in upward rotation excessively and leaning of the lateral trunk to compensate glenohumeral rotation loss. Restricted shoulder motion range of capsular pattern include internal rotation, abduction, and external rotation. Also, all movements of the glenohumeral joint in all planes are limited in adhesive capsulitis.<sup>4</sup>

Functional outcomes, active movements (flexion, internal rotation, abduction, external rotation), and pain are primary and vital outcomes following treatment with adhesive capsulitis. Adhesive capsulitis is usually managed with Physiotherapy using cold or hot modalities, Muscle Energy Techniques, Maitland Mobilization Technique, and active exercises. Muscle Energy Technique and Maitland Mobilization Technique is a vital part of intervention including accessory movement and normal physiologic movement.<sup>5</sup> The present study was conducted to comparatively evaluate the efficacy of Maitland mobilization technique to muscle energy technique on functional activity, motion range, and pain in subjects with adhesive capsulitis.

## MATERIALS AND METHODS

The present prospective clinical study was conducted to comparatively evaluate the efficacy of the Maitland mobilization technique to muscle energy technique on functional activity, motion range, and pain in subjects with adhesive capsulitis. The study was carried out at Government Medical College Rajouri, Jammu and Kashmir after obtaining clearance from the concerned Ethical committee. The study population was comprised of the subjects visiting the Department of Physiotherapy and Rehabilitation and the Department of Orthopedics of the institute. For the present study, 36 subjects were screened who had adhesive capsulitis where 26 subjects met the inclusion criteria and were finally included in the study. After explaining the detailed study design, informed consent was taken from all the subjects in both written and verbal form. After the final inclusion of the subjects in the study, the subjects were divided into two groups randomly having 13 subjects each. The present study included 26 subjects from both genders and within the age range of 38-64 years.

The inclusion criteria for the present study were subjects in the stiffening phase and painful phase of adhesive capsulitis, subjects having Apley's scratch test positive, and subjects who were willing to participate in the study. The exclusion criteria for the study were subjects having red flags to mobilization, Myocardial infarction, adhesive capsulitis treated with physiotherapy before 3 months, pathology neck pain, manipulation under anesthesia, Thoracic outlet syndrome, trauma to the joint structure and soft tissue, Upper limb neurological deficit, and shoulder dislocation.

The study data assessed preoperatively and postoperatively were Shoulder Pain and Disability Index (SPADI), Numerical pain rating scale (NPRS), Shoulder Range of motion (goniometer), Goniometer (universal), and Assessment chart. The two groups of study subjects having 13 subjects each were there where Group I subjects were managed with Maitland Mobilization Technique and Group II subjects with Muscle Energy Technique for 2 weeks.

The collected data were subjected to the statistical evaluation using SPSS software version 21 (Chicago, IL, USA) and one-way ANOVA and t-test for results formulation. The data were expressed in percentage and number, and mean and standard deviation. The level of significance was kept at  $p < 0.05$ .

## RESULTS

The present prospective clinical study was conducted to comparatively evaluate the efficacy of the Maitland mobilization technique to muscle energy technique on functional activity, motion range, and pain in subjects with adhesive capsulitis. The subjects were divided into two groups randomly having 13 subjects each. The present study included 26 subjects from both genders and within the age range of 38-64 years. Group I subject were managed with Maitland Mobilization Technique and Group II subjects with Muscle Energy Technique for 2 weeks.

The study outcomes following Group I treatment for adhesive capsulitis with Maitland Mobilization Technique are depicted in Table 1. It was seen that SPADI before and after treatment was  $62.33 \pm 10.321$  and  $10.83 \pm 5.10319$  respectively which was statistically significant with  $p < 0.001$ . Also, external shoulder rotation before and following therapy was  $33.212 \pm 13.422$  and  $57.48 \pm 13.426$  respectively which showed statistically significant improvement following therapy ( $p < 0.001$ ). Abduction of the shoulder also improved significantly following treatment from  $115 \pm 22.496$  to  $168.19 \pm 22.492$  which was also statistically significant with  $p < 0.001$ . Pain following therapy decreased significantly from  $7.426 \pm 1.489$  to  $6.069 \pm 1.485$  following treatment which was statistically significant with  $p < 0.001$ .

These study outcomes following muscle energy technique in Group II subjects were also assessed, and are summarized in Table 2. The study results showed that SPADI before and after treatment was  $64.640 \pm 7.3$  and

15.140±7.1 respectively which was statistically significant with  $p<0.001$ . Also, external shoulder rotation before and following therapy was 34.8±9.775 and 54.283±9.773 respectively which showed statistically significant improvement following therapy ( $p<0.001$ ). Abduction of the shoulder also improved significantly following treatment from 117.3±21.340 to 163.90±21.338 which was also statistically significant with  $p<0.001$ . Pain following therapy decreased significantly from 7.212±1.155 to 1.783±1.153 following treatment which was statistically significant with  $p<0.001$ .

On intergroup comparison, it was seen that shoulder pain disability index (SPADI) differed statistically non-significant variation between Maitland mobilization technique and Muscle energy technique with  $p=0.212$ . External rotation, ROM abduction of the shoulder, and the pain were showed a statistically non-significant variation between the Maitland mobilization technique and Muscle energy technique with respective  $p$ -values of 0.41, 0.31, and 0.243 respectively as shown in Table 3.

## DISCUSSION

The present prospective clinical study was conducted to comparatively evaluate the efficacy of the Maitland mobilization technique to muscle energy technique on functional activity, motion range, and pain in subjects with adhesive capsulitis. The subjects were divided into two groups randomly having 13 subjects each. The present study included 26 subjects from both genders and within the age range of 38-64 years. Group I subject were managed with Maitland Mobilization Technique and Group II subjects with Muscle Energy Technique for 2 weeks. The study results have shown that SPADI before and after treatment was 62.33±10.321 and 10.83±5.10.319 respectively which was statistically significant with  $p<0.001$ . Also, external shoulder rotation before and following therapy was 33.212±13.422 and 57.48±13.426 respectively which showed statistically significant improvement following therapy ( $p<0.001$ ). Abduction of the shoulder also improved significantly following treatment from 115±22.496 to 168.19±22.492 which was also statistically significant with  $p<0.001$ . Pain following therapy decreased significantly from 7.426±1.489 to 6.069±1.485 following treatment which was statistically significant with  $p<0.001$ . These results were consistent with the results of Vermeulen HM et al<sup>6</sup> in 2006 and Gayasi AA et al<sup>7</sup> in 2014 where authors have shown significant improvement in subjects with adhesive capsulitis following the Maitland Mobilization technique.

The study outcomes following muscle energy technique in Group II subjects were also assessed, and are summarized in Table 2. The study results showed that SPADI before and after treatment was 64.640±7.3 and 15.140±7.1 respectively which was statistically significant with  $p<0.001$ . Also, external shoulder rotation before and following therapy was 34.8±9.775 and 54.283±9.773 respectively which showed statistically significant improvement following therapy ( $p<0.001$ ). Abduction of the shoulder also improved significantly following treatment from 117.3±21.340 to 163.90±21.338 which was also statistically significant with  $p<0.001$ . Pain following therapy decreased significantly from 7.212±1.155 to 1.783±1.153 following treatment which was statistically significant with  $p<0.001$ . These results were in agreement with the studies of Lisi Anthony J et al<sup>8</sup> in 2002 and Moore SD et al<sup>9</sup> in 2011 where improvement in functions, motion range, and pain was seen in subjects with adhesive capsulitis following application of the Muscle Energy Technique.

On intergroup comparison, it was seen that shoulder pain disability index (SPADI) differed statistically non-significant variation between Maitland mobilization technique and Muscle energy technique with  $p=0.212$ . External rotation, ROM abduction of the shoulder, and the pain were showed a statistically non-significant variation between the Maitland mobilization technique and Muscle energy technique with respective  $p$ -values of 0.41, 0.31, and 0.243 respectively. These results were similar to the findings of Narayan et al<sup>10</sup> in 2014 and Erin McLaughlin et al<sup>11</sup> in 2015 were a significant improvement in functions, motion range, and the pain was seen in

subjects with adhesive capsulitis following application of the Muscle Energy Technique as well as Maitland Mobilization technique.

## CONCLUSION

Within its limitations, the present study concludes that both the Maitland Mobilization technique as well as Muscle energy technique was effective for treating adhesive capsulitis both clinically and functionally with significant improvement in pain, functional outcomes, and range of motion. However, the present study had a few limitations including a small sample size, short monitoring time, and geographical area biases. Hence, more longitudinal studies with a larger sample size and longer monitoring period will help reach a definitive conclusion.

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## TABLES

| Outcomes                                   | Pre-treatment<br>(Mean± S. D) | Post-treatment<br>(Mean± S. D) | p-value |
|--|-------------------------------|--------------------------------|---------|
| Shoulder Pain and Disability Index (SPADI) | 62.33±10.321                  | 10.83±5.10.319                 | <0.001  |
| External rotation of the shoulder          | 33.212±13.422                 | 57.48±13.426                   | <0.001  |
| Abduction of shoulder                      | 115±22.496                    | 168.19±22.492                  | <0.001  |
| Pain                                       | 7.426±1.489                   | 6.069±1.485                    | <0.001  |

Table 1: Pre-treatment and post-treatment parameters in subjects following Maitland Mobilization Technique

| Outcomes                                   | Pre-treatment<br>(Mean± S. D) | Post-treatment<br>(Mean± S. D) | p-value |
|--|-------------------------------|--------------------------------|---------|
| Shoulder Pain and Disability Index (SPADI) | 64.640±7.3                    | 15.140±7.1                     | <0.001  |
| External rotation of the shoulder          | 34.8±9.775                    | 54.283±9.773                   | <0.001  |
| Abduction of shoulder                      | 117.3±21.340                  | 163.90±21.338                  | <0.001  |
| Pain                                       | 7.212±1.155                   | 1.783±1.153                    | <0.001  |

Table 2: Pre-treatment and post-treatment parameters in subjects following Muscle Energy Technique

| Outcomes                                   | Maitland Mobilization<br>Technique(Mean± S. D) |                | Muscle Energy Technique<br>(Mean± S. D) |                    | p-<br>value |
|--|--|----------------|---|--------------------|-------------|
|  | Pre-treatment                                  | Post-treatment | Pre-<br>treatment                       | Post-<br>treatment |             |
| Shoulder Pain and Disability Index (SPADI) | 62.33±10.321                                   | 10.83±5.10.319 | 64.640±7.3                              | 15.140±7.1         | 0.212       |
| External rotation of the shoulder          | 33.212±13.422                                  | 57.48±13.426   | 34.8±9.775                              | 54.283±9.773       | 0.41        |
| ROM Abduction of shoulder                  | 115±22.496                                     | 168.19±22.492  | 117.3±21.34                             | 163.90±21.338      | 0.31        |
| Pain                                       | 7.426±1.489                                    | 6.069±1.485    | 7.212±1.155                             | 1.783±1.153        | 0.243       |

Table 3: Intergroup comparison between Pre-treatment and post-treatment parameters in subjects following Maitland Mobilization Technique and Muscle Energy technique