

Comparing the effects of muscle energy technique and mulligan mobilization with movements on pain, range of motion, and disability in adhesive capsulitis

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Abstract

Objective: To compare the effect of muscle energy technique and Mulligan mobilisation with movement on pain, range of motion and disability in patients of adhesive capsulitis.

Methods: The single-blind, randomised controlled study was conducted at the Physiotherapy Department of Mayo Hospital, Lahore, Pakistan, from July to December, 2018, and comprised patients of either gender aged 30-70 years with adhesive capsulitis stage 2. The subjects were randomised using the lottery method into Mulligan mobilisation with movement group A, and the muscle energy technique group B. Conventional treatment, including hot packs and exercises like pulley rope exercise, wall climbing, and shoulder wheel, were part of both the groups. Each technique was applied five times per set, 2 sets per session 3 days a week for three weeks. Baseline and post-intervention readings were recorded for pain, range of motion and disability Using numeric pain rating scale, goniometer, and shoulder pain and disability index. Data was analysed using SPSS 23.

Results: Of the 70 individuals assessed, 64(91.4%) were included; 32(50%) in each of the two groups. The mean age in group A was 49.93 ± 6.69 years, while in group B it was 49.17 ± 8.92 years. Group A showed significantly better results compared to group B ($p < 0.05$).

Conclusion: Muscle energy technique and Mulligan mobilisation with movement were both found to be effective, but the latter was significantly better compared to the former.

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Introduction

Any injury, damage or pathology that affects any tissue, muscle, joint or ligament of the body is known as a musculoskeletal disorder whose prevalence is increasing due to workload, bad posture, and activities of daily living (ADLs). Every person suffers from musculoskeletal disorders once in a life. Its sign and symptoms include pain, stiffness, swelling, limitation of joints, shoulder pain, low back pain, tendonitis, sprain and strains.¹

Frozen shoulder is also known as peri-arthritis or adhesive capsulitis. It is a pathology in which inflammation in the shoulder joint causes scapular humeral pain, leading to loss of functional range actively and passively, and limitations of ADLs. Codman was the first who used the word 'frozen shoulder' and declared subacromial bursa as a secondary cause defining the tendinitis condition. He distinguished that there were many other conditions which lead to

rotator spasm or caused adhesion in the bursa or joints. The accurate cause has not been definitively established though.²

About 2-5.3% of people suffer from primary adhesive capsulitis, approximately 70% cases occur in females, and people aged 40 years or above.³ Its cause is still not clear, but it is categorised into primary and secondary causes. Recent surgery, immobilisation, trauma, extrinsic or intrinsic pathology, thyroid pathology, diabetes, tendinitis, rotator cuff pathology, and calcific tendinitis lead to secondary adhesive capsulitis, while inflammation in the joint causes primary adhesive capsulitis.⁴ Mostly it affects people aged 40-60 years⁵ Muscle guarding, pain, limited movements, capsular tightness, functional disability to perform an overhead task characterise the condition.⁶ The patient faces difficulty while dressing, keeping the hand close to the mouth, washing clothes and dishes, or lifting heavy objects.⁷ Adhesive capsulitis has 3 stages. Stage 1 lasts 2-9 month and patients suffer from pain. Stage 2 lasts 4-12 months and patients suffer from stiffness and pain. Stage 3 lasts 12-43 months and this phase is called resolution because stiffness resolution starts in this phase.³ Studies have concluded that adhesive capsulitis mostly occurs around age 40-65 years. About 3% occur in

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youngsters, especially women. Its prevalence rate increases 2-4 times in diabetic patients and in those with thyroid disease interrelated with diabetes.⁸ The treatment plan for adhesive capsulitis includes pain-killers, anti-inflammatory tablets, steroidal injections and physiotherapy. Physiotherapy includes hot pack, manipulation and mobilisation exercises.⁹ In muscle energy technique (MET), voluntary muscle contraction is performed by the patient which is stretched and the therapist applies counterforce against that movement.¹⁰ Mulligan mobilisation with movement (MWM) is a manual technique in which manual gliding is applied on a painful joint.¹¹

The current study was planned to compare the effect of MET and MWM on pain, range of motion (ROM) and disability in adhesive capsulitis patients.

Patients and methods

The single-blind (in which assessor was kept blind), randomised controlled trial (RCT) was conducted at the Physiotherapy Department of Mayo Hospital, Lahore, Pakistan, from July to December, 2018. After approval from the ethics review board of King Edward Medical University, Lahore, the sample size was calculated with 5% level of significance, 90% power of the test and using predictable mean value of MWM (12) as 1.66 ± 1.02 and MET(13) as 2.44 ± 1.18 ; where σ^2 = variance 1.21, $Z_{1-\alpha}$ = confidence level 95% = 1.96, $Z_{1-\beta}$ = power of test 90%, μ_0 = population means 1(MWM), μ_a = population mean 2 (MET) using the formula

$$n = 2\sigma^2 (Z_{1-\alpha} + Z_{1-\beta})^2 / (\mu_0 - \mu_a)^2 \quad 14$$

The sample was raised using non-probability purposive sampling technique from among individuals of either gender aged 30-70 years and having stage 2 bilateral/unilateral adhesive capsulitis. Those with malignancy or neuromuscular disorders, conditions that were contraindicated to manual therapy, those receiving treatment concurrent to the study were excluded. Also excluded was data related to any participant who was unable to return for follow-up treatment or evaluation.

All individuals who came to the Physiotherapy Department were considered and screened for adhesive capsulitis stage 2.

After taking informed consent from the subjects included, they were randomised using the lottery method into MWM group A and MET group B. Conventional treatment, including hot packs for 10 minutes and wand exercises, pulley rope, shoulder wheel exercises and wall climbing exercises, were part of both the groups. Each technique was applied five times per set, 2 sets per session 3 days a week for three weeks. Numeric pain rating scale (NPRS),

goniometer and shoulder pain and disability index (SPADI) were used as data-collection tools. NPRS is used to assess pain intensity from 0 to 10 ranging from 'no pain' to 'worst pain'. It is a valid and reliable tool for measuring pain intensity compared to the visual analog scale (VAS).¹⁵ SPADI, a questionnaire used for assessing shoulder disability and pain, is scored from 0 to 130, with higher score indicating worse condition. It is a valid and reliable tool for assessing shoulder disability.¹⁶ Goniometer is a scale that is used to measure ROM. It helps make any diagnosis regarding functional activity or ROM.¹⁷

Data was analysed using SPSS 23. Statistical significance α was set at 5%. Man Whitney Utest for non-parametric data was used to analyse inter-group differences. Wilcoxon sign test for non-parametric data was used to analyse intra-group differences between baseline and post-intervention values.

Results

Of the 70 individuals assessed, 64(91.4%) were included; 32(50%) in each of the two groups (Figure). The mean age

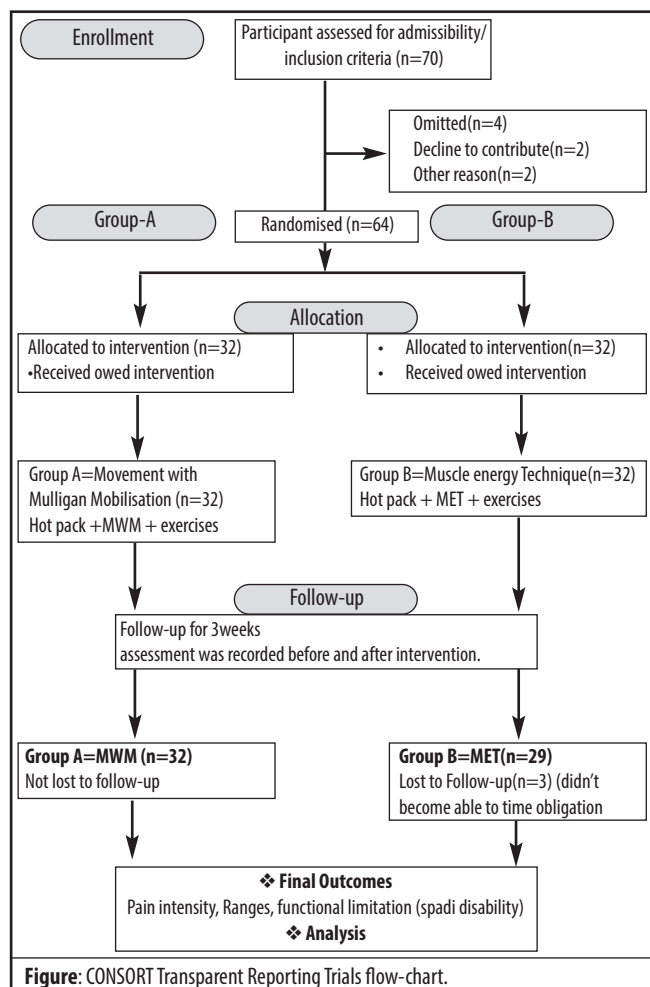


Table-1: Intra-group NPRS scores at baseline and post-intervention.

Comparison of pain between and within group A and B pre and post							
Treatment Group	Pre-Treatment Mean±SD	Post Treatment Mean±SD	Mean Difference	Median + IQR Pre	Median + IQR post	p-value Pre	p-value post
Group A (MWM)	6.56±0.56	1.15±1.05	5.41±0.49	7.00+1.00	1.00+0.00	5.01	0.00
Group B (MET)	6.41±0.50	4.34±0.89	2.07±0.39	6.00+1.00	4.00+1.00	5.05	0.00

NPRS: Numeric pain rating scale, MWM: Mulligan mobilisation with movement, MET: Muscle energy technique, SD: Standard deviation, IQR: Interquartile range. ** $p < 0.05$ is considered significant.

Table-2: SPADI between and within both group A and B Pre- and Post-treatment.

Comparison of SPADI between and within group A and B pre and post							
Treatment Group	Pre-Treatment Mean±SD	Post Treatment Mean±SD	Mean Difference	Median + IQR Pre	Median + IQR post	p-value Pre	p-value post
Group A (MWM)	53.25±7.09	5.50±2.91	47.75±4.18	52.00+4.00	7.00+4.00	4.94	0.00
Group B (MET)	49.17±3.84	27.0±3.75	22.17±0.09	48.00+3.50	28.00+4.00	54.71	0.00

SPADI: Shoulder pain and disability index, MWM: Mulligan mobilisation with movement, MET: Muscle energy technique, SD: Standard deviation, IQR: Interquartile range. $p < 0.05$ is considered significant.

Table-3: Movements ranges between and within groups A and B pre- and post-treatment.

Comparison of range of motion between and within group A & B pre and post treatment								
Treatment Group	Variable	Pre-Treatment Mean±SD	Post Treatment Mean±SD	Mean Difference	Median + IQR Pre	Median + IQR post	p-value Pre	p-value post
Group A (MWM)	Flexion	75.56±8.02	166.31±17.01	90.75±8.99	75.00+10.00	170.00+20.00	4.95	0.00
	Extension	12.09±4.97	58.00±12.73	45.91±7.76	12.00+5.00	55.00+15.00	4.94	0.00
	Abduction	49.03±11.92	162.09±16.53	113.06±4.61	48.00+10.00	165.00+10.00	4.94	0.00
	Adduction	11.92±3.35	57.18±18.01	45.26±14.66	12.00+5.00	60.00+32.00	4.54	0.00
Group B (MET)	Flexion	75.37±13.64	107.17±20.93	31.8±7.29	75.00+8.00	100.00+10.00	4.69	0.00
	Extension	12.41±3.72	30.20±14.72	17.79±11.00	11.00+5.00	22.00+22.00	4.72	0.00
	Abduction	54.17±8.89	97.06±23.23	42.89±14.34	55.00+3.50	90.00+20.00	4.75	0.00
	Adduction	11.51±3.90	28.68±11.89	17.17±7.99	10.00+5.00	25.00+20.00	4.72	0.00

SPADI: Shoulder pain and disability index, MWM: Mulligan mobilisation with movement, MET: Muscle energy technique, SD: Standard deviation, IQR: Interquartile range. $p < 0.05$ is considered significant.

in group A was 49.93 ± 6.69 years, while in group B it was 49.17 ± 8.92 years. Group A showed significantly better result compared to group B ($p < 0.05$).

Mean post-intervention NPRS values were better compared to baseline readings in both groups, but group A showed significantly better result compared to group B ($p < 0.05$) (Table 1). The same was the case with SPADI values (Table 2) and ROM (Table 3).

Discussion

The comparative study showed that both MWM and MET techniques were effective for treatment purposes, but MWM was more effective in decreasing pain, increasing ROM, and improving functional activity.

A double-blind RCT to assess the therapeutic effects of MWM and MET in lateral epicondylitis had 30 patients randomly allocated into two equal groups. Group A was treated with MWM and group B with MET, while ultrasound was given as the baseline treatment. It concluded that MWM was more effective compared to MET.¹⁸

Both techniques showed significant intra-group improvement, but MWM showed significantly more improvement in the current study.

Another RCT compared the effect of adductor stretch MWM and MET in patients with hip adductor tightness and found MWM to be more effective compared to MET.¹⁹

Besides, one study compared the efficacy of MWM, MCT and conventional treatment in chronic sacroiliac joint dysfunction patients, and concluded that MWM was more effective compared to MET and conventional treatment.²⁰

Conclusion

Both MCT and MWM techniques were effective in reducing pain, increasing ROM, and reducing the difficulty faced by individuals related to ADLs, but MWM was more effective compared to MET in managing patients with adhesive capsulitis.

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