

A Comparative Study on the Effects of Mulligans Technique Versus Conventional Therapy in Subjects with Frozen Shoulder Syndrome

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Abstract: *Background and purpose:* The purpose of this study is to compare the treatment techniques of mulligan mobilization with conventional therapy and only conventional therapy in subjects with frozen shoulder syndrome (FSS). *Subjects:* 30 subjects with frozen shoulder syndrome. *Method:* Study design: It is experimental study with randomised controlled trial. The subjects were divided in to two equal groups by simple random technique. Before the treatment pretest measurement is taken by standardised index of shoulder function (FI2S) scale. Group A received mobilization with movement and conventional therapy includes shortwave diathermy, pendular exercise, pulley exercise, wand exercise for 5 times per week for 1 month and group B received only conventional therapy. Both the group received treatment for 4 weeks. At the end of 4th week again the outcomes were measured by standardised index of shoulder function (FI2S) scale. *Result:* Overall subjects in both groups improved over the 4 weeks. But statistically significant improvements were found in mobilization with movement and conventional therapy group than with only conventional therapy group. *Conclusion:* In subjects with FSS mobilization with movement along with conventional therapy are more effective than only with conventional therapy.

Keywords: frozen shoulder, mulligan technique, FI2S

1. Introduction

Frozen shoulder is a musculoskeletal disorder in which the capsule of joint, surrounding connective tissue becomes stiff, inflamed and shortened. This condition is also called adhesive capsulitis. There are three stages of frozen shoulder: The **first stage** that is described is called the freezing or painful stage. The second stage the frozen shoulder or transitional stage. The third stage or the thawing stage.⁽¹⁾ It grows gradually from restriction of shoulder range of movements to severe stiffness and chronic pain^(2,3). Between the articular surfaces, there grows abnormal tissue that cause restriction of joint motion. In addition to this, there may be lack of synovial fluid that provide lubrication to shoulder joint during intra-articular movements⁽⁴⁾. On the basis of degree of joint space restriction between joint capsule and glenoid cavity, frozen shoulder is differentiated with regard to complication, pain level and stiffness degree. Treatments advocated for frozen shoulder include physiotherapy interventions such as heat application, ultrasound, interferential treatment, stretching, exercises, mobilization and manipulative treatment options that includes high velocity, low amplitude manipulation, end range mobilization, mid range mobilization, and mobilization with movement of the shoulder⁽⁵⁾. The Mobilizations with movement (MWM) for peripheral joints has been developed by Brian Mulligan. MWM can be used in isolation or integrated with other manual approaches to improve the quality of joint intra articular gliding, neurodynamics and the facilitation of correct muscle recruitment. It is a combination of an active movement with simultaneous passive accessory mobilizations, to achieve painless movement by restoring the reduced accessory glide. In essence, the limited painful physiological movement is performed actively while the therapist applies a sustained accessory glide at right angles or parallel to the joint to

restore a restricted, painful movement to a pain free and full range state. The combination of joint Mobilization with active movement may be responsible for the rapid return of pain free movement⁽⁶⁾. Measurement of parameters were taken by FI2S. In which including parameters are pain, active mobility, function & strength. Total score of FI2S is 100. Reliability of FI2S is Inter-test reliability and inter-rater reliability are with intra-class correlation coefficient of 0.93 and 0.94 respectively.⁽⁷⁾ Purpose of this study is to know the effects of manual therapy techniques like Mulligan therapy for improving the shoulder function of subjects with frozen shoulder syndrome. Aim of this study is to compare the treatment techniques of mulligan mobilization with conventional therapy in subjects with frozen shoulder syndrome.

2. Materials and Methodology

The proposed study was simple randomised control trial. It was pretest, posttest experimental study. 30 subjects were selected by means of simple random sampling procedure. This study was conducted at Shree B. G. Patel College of Physiotherapy, Anand. Subjects with age group of 40 to 75 years, both male and female subjects, patients having restriction of range of motion of abduction, flexion and external rotation were included in this study. Hypermobility, dislocation of shoulder joint, subluxation of shoulder joint, fracture of humerus or scapula, shoulder impingement, neurological problems, subject under any medications, associated with cervical and thoracic symptoms, instability of gleno humeral joint were excluded in this study. Measurements of study taken by standardized index of shoulder function (FI2S) scale. Thirty subjects with age group of 40 to 75 years having the frozen shoulder pain syndrome were selected according to the baseline inclusion & exclusion criteria. Patients consent was obtained and were

allocated into two equal groups. Group –A received mulligan technique with conventional therapy and Group –B received only conventional therapy. Pretest measurement were taken for pain and shoulder disability by FI2S scale. By the end of the 4th week post test were taken as similar to the pretest measurement.

Group-A received Mulligan mobilization: the method of application for :

A) shoulder abduction to dorsally glide the humerus of large patient, therapist stand behind the seated patient and place the belt around therapist hips and the patient's shoulder. Place a hand on the scapular for fixation and lean back in such a way as to glide the humeral head back obliquely, and slightly down, in the treatment plane. Therapist free hand's fingers would secure the belt and prevent it from Slipping. Ensure that the belt does not slightly elevate the humeral head as this will jam the joint and inhibit movement. It is applied for 10 glides in each repetition and 3 repetition per session.⁽⁸⁾

B) For shoulder flexion Lie the patient supine and at the head of the bed grasp the humerus with one hand and the forearm with the other on the effected side. Now push down along the shaft of humerus while the patient tries to raise his arm. This procedure does two things. It glides the head of the humerus dorsally on the glenoid and also down when the arm is above 90° which is bonus. In endeavouring to achieve an increase in flexion look for a pain free direction. Move the arm up, further away from the side of the head. If able, grip the arm with one hand and use the medial border of therapist other hand to reposition the humeral head to reposition the humeral head dorsally in the glenoid fossa, over the last degrees of elevation.⁽⁸⁾

3) For external rotation To improve external rotation first shoulder flexion with 90° and elbow flexion 90° and then apply belt over the humerus shaft in proximal part and then give the distraction and then apply external rotation⁽⁸⁾.

Conventional therapy subjects received Short wave diathermy through contra planar method. Electrodes placed over the anterior and posterior aspects of shoulder joint. This modality is given over shoulder joint for 10 minutes/session and 5 sessions/ week. Wand exercise-for flexion, extension, abduction, adduction, internal , rotation, external rotataion- 10 repitation/day, finger ladder exercise, pulley exercise, pendular exercise. Group B received only conventional therapy. At the end of the 4th week post test measurement were taken for both the groups by using standardised index of shoulder function (FI2S scale) and then compared.

3. Result & Statistical analysis

Group-A: Mulligan technique with conventional therapy

Group-B: only conventional therapy

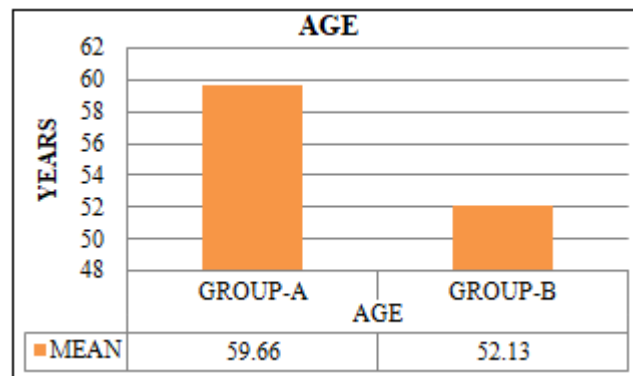


Figure 1: Demographic data (AGE)

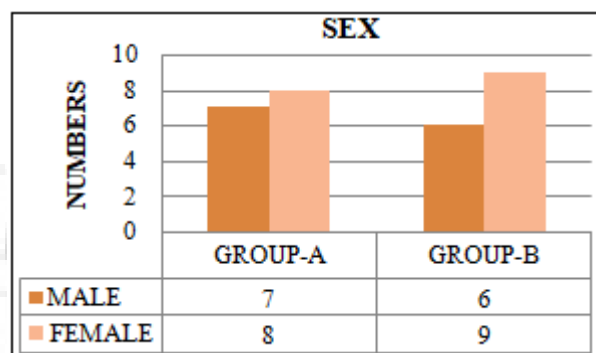


Figure 2: Demographic data (SEX)

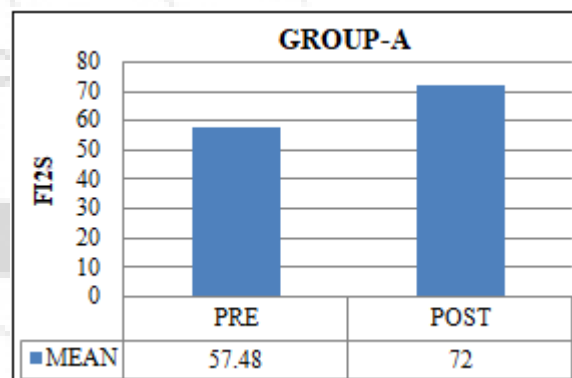


Figure 3: Comparison of pre & post FI2S in group-A by paired 't' test

-At 95% confidence interval = -16.74 to -12.29.
 -In this test 't' calculated value > 't' tabulated value.

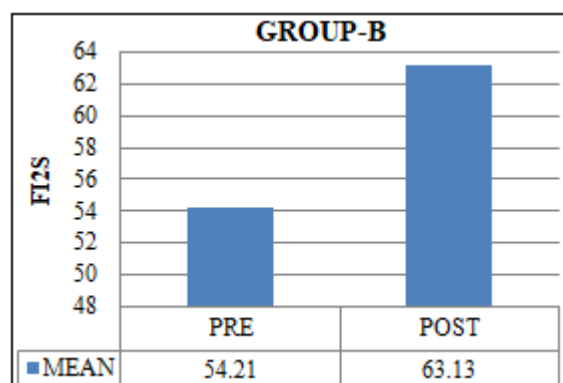


Figure 4: Comparison of pre & post FI2S in group-B by paired 't' test

-At 95% confidence interval = -11.75 to -6.086.

-In this test 't' calculated value > 't' tabulated value.

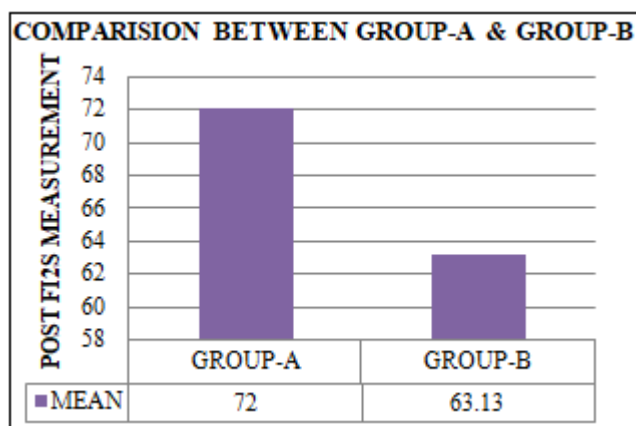


Figure 5: Comparison between Group-A & Group-B post FI2S measurement by using unpaired 't' test

-At 95% confidence interval = 1.279 to 16.45.

-In this test 't' calculated value > 't' tabulated value

From the statistical analysis:

There was significant improvement in FI2S scale in both the groups. However the increase in FI2S is much greater in Group-A when compared to Group-B.

4. Discussion

The results of present study showed that both the techniques are effective in improving shoulder functions in subject frozen shoulder syndrome. However more improvement was found in mulligan technique with conventional therapy group compared to only conventional group. Demographic data of both the groups were found to be similar with exception of duration of symptoms. Base line clinical characteristics showed similarity in FI2S scale. Out of 30 subjects, 15 subjects were given mulligan technique with conventional therapy and other 15 subjects were given only conventional therapy. Data of these subjects were analysed for intention to treat analysis. None of patients included in study reported of any kind of trauma or surgery. At baseline both the groups showed similarities with regards to FI2S scale. Then after treatment was given to both the groups for 4 weeks and post test measurement was taken again by FI2S scale. The data were analysed with paired and unpaired 't' test with 95% of confidence interval. This indicates that the most beneficial effect can be achieved with mulligan therapy and not only with conventional therapy.

In the present study it was found that there is a statistically significant improvement in pain, shoulder mobility and functional disability within mulligan with conventional therapy group. Mulligan technique was found to be effective by neurophysiological mechanism of production of initial hypoalgesia based on stimulation of peripheral mechanoreceptors and the inhibition of nociceptors and altering sympathetic nervous system, and biomechanical concept of positional fault correction produces total and immediate pain relief during the treatment application. It corrects the positional fault and there is an immediate change in the bony position during application of mulligan technique. One explanatory mechanism underlying this

manipulative therapy induced pain modulation is the activation of the descending pain inhibitory system within the central nervous system⁽⁹⁾ The active movement in this technique stimulates the proprioceptive tissues, such as the golgi tendon organ by tendon stretch.⁽¹⁰⁾ Mulligan techniques repositions the joint, causing it to track normally.⁽¹¹⁾ Mulligan techniques passively stretches the tightened soft tissues and shoulder capsule in adhesive capsulitis and thereby restores the normal extensibility of the shoulder capsule and tight soft tissues. This initial effect is sufficient to stimulate the long term changes in nociceptive and motor system dysfunction that are reflected in pain relief and improved function⁽¹²⁾

Jing-Ian Yang et al compared the use of three mobilization techniques – end range mobilization, mid range mobilization and mulligan technique in the management of subjects with frozen shoulder syndrome and found that end range mobilization and mulligan technique were more effective in increasing mobility and functional ability⁽¹³⁾

But, the recent research showed that Mulligan therapy like mobilization with movement will give better effect than with other conventional therapy. So, an attempt is made in the study to compare Mulligan technique and conventional therapy in subjects with frozen shoulder syndrome

Therefore in present study the mechanisms behind the effectiveness of mulligan technique is based on the neurophysiologic effect on pain reduction, correction of mechanical dysfunction and positional fault. Thus, promoting alleviation of pain, restoring ROM and earlier return to function. There is a statistically significant difference in objective measures such as shoulder mobility and functional disability. Therefore considering the significant difference in objective measure means the study rejects the null hypothesis.

5. Limitations of the Study

Subjects with small sample size.

6. Conclusion

From this study it was concluded that there was significant improvement in FI2S scale in group-A than compared with group-B. Hence the mulligan technique with conventional therapy is more effective than only conventional therapy in subjects with frozen shoulder syndrome.

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Appendix I: Standardized Index of Shoulder Function (FI2S)

Appendix 1: Standardized Index of Shoulder Function (FES)					
Standardized Index of Shoulder Function					
Pain	Analgesics drug consumption	Daily 0	Irregular 3.5	Never 7	Total pain /28
	Pain at rest	Unbearable 0	Bearable or Inconstant 3.5	None 7	
	Pain for usual activities	Unbearable 0	Bearable or Inconstant 3.5	Normal 7	
	Night-time pain	Sleep is very disturbed 0	Sleep is moderately disturbed 3.5	Normal 7	
Range of motion	Forward flexion 0–60 1	Abduction 0–60 1	External rotation (at abduction 90°) 0–30 1	Thumb/C7 Distance (cm) > 60 0	Total ROM /24
	61–80 2	61–80 2	31–45 2	41–60 2	
	81–100 3	81–100 3	46–60 4	21–40 4	
	101–120 4	101–120 4	61–90 6	< 20 6	
	121–140 5	121–140 5			
	141–160 6	141–160 6			
Function	Ask the patient to perform every activity: 6 points if performed without any compensation 3 points if possible with compensation or performed with difficulties 0 pt if impossible				Total function /30
	To comb hair back from the forehead				
	To pull on or off a sweater				
	To catch an object at eye-level				
	To open a door				
Strength $F = kg \times p$	To pull up pants or skirt				Total strength /18
	The patient must hold the handle of a spring balance in his hand, palm of the hand facing the floor, at arm's length in both 90° of forward flexion and 90° of abduction in the coronal plane. The patient is asked to maintain this elevation for 5 s, repeated 3 times, the average (kg) is noted and multiplied by the applicable adjustment coefficient below to obtain the total strength score.				
	<i>P</i>	< 50 years old	50–60 years old	> 60 years old	
	Men	2	2.5	3	
	Women	3	4	5	
					Total /100