

# Effect of Muscle Energy Technique and Specific Inferior Capsular Stretching in Frozen Shoulder

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**Abstract:** ***Background:** Shoulder Joint is the most mobile joint in the human body. It undergoes shoulder pathology because less stability is provided by the adjacent structures. The most common structure affected in frozen shoulder is the inferior joint capsule because the inferior capsule is thin and deficient for the passage of long head of biceps. **Method:** Experimental study was conducted at Krishna College of Physiotherapy, Karad. 30 participants with age group of 40- 70 years both genders were selected according to the inclusion criteria. Group A (15) participants treated with MET and specific inferior capsular stretch. group B (15) were treated with MET. **Results:** statistical analysis was done using paired and unpaired-t test. The outcome was measured in terms of VAS, ROM, SPADI. The statistical analysis for both the groups was done by Paired t test within group and unpaired t test between groups. The statistical analysis showed extreme significance after the treatment for consecutive 4weeks with 5 sessions per week. **Conclusion:** Thus, from the above conducted study it concludes that effect of muscle energy technique and specific inferior capsular stretching had significant improvement clinically and statistically on SPADI score, VAS and ROM thus facilitating functional outcomes.*

**Keywords:** Frozen shoulder, Diabetes mellitus, Inferior capsular stretch, MET.

## 1. Introduction

Shoulder Joint is the most mobile joint in the human body and hence it is more prone to undergo shoulder pathology because less stability is provided by the adjacent structure like ligaments and muscles.

The Shoulder joint is ball and socket type of synovial joint with three degree of freedom. They are flexion-extension, abduction-adduction, medial and lateral rotation and circumduction

The shoulder complex joint made up of five joints. They are – Glenohumeral Joint, Strenoclavicular Joint, Acromioclavicular Joint, Scapulothoracic Joint, Coracoacromial arch.

Frozen shoulder is a self limiting condition that affects the people in there 4<sup>th</sup> to 6<sup>th</sup> decade of life. The population which is more commonly affected with this condition are oftenly women The diabetic group of individual are more prone to suffer from this condition.

The predominant features of this condition is pain, and restriction of joint motion which leads to stiffness of shoulder joint. Due to the restriction in shoulder joint motion the individuals suffering from frozen shoulder have greater functional disability. More commonly it affects overhead activity.

The most common structure affected in frozen shoulder is the inferior joint capsule of shoulder joint because-the inferiopr capsule is thin and deficient for the passage of long head of biceps. Frozen shoulder affects approximately 2% to 5% of the general population and 10% to 15% of the population with diabetes.

## 2. Materials and Methods

Ethical clearance is obtained from the institutional ethical committee KIMSUDU karad Experimental study was done and a group of 30 participants were taken for the study. The participants were divided into 2 groups – Group A and Group B. both the genders were selected.

The participants who meet the inclusion and exclusion criteria and willing to participate in the study were included. The participants were explained about the study and the evaluation procedure. The informed consent was obtained from the individuals. The inclusion criterion of the study was:(1) Symptomatic subjects between the age group of 40-70 years.(2) Both genders. (3) Subject having stiff and painful shoulder for more than 1 month. (4) Minimum 50% of restriction in abduction and external rotation of shoulder joint. (5) Diabetics individuals. The exclusion criteria was (1) History Of recent shoulder trauma in and around shoulder joint. (2) Rotator cuff injuries. (3) Intrinsic glenohumeral pathology such as glenohumeral arthritis.(4) Previous surgeries. Initial thorough assessment of each subject was taken as per data collection sheet .VAS score Shoulder ROM, Shoulder Pain and Disability Index was taken pre interventional and 4 weeks post-interventional. Hot moist fomentation and ultrasound was given to both the groups prior interventions. Group A (15) were participants were selected and were given hot moist packs, ultrasound, MET, inferior capsular stretch . group B (15) were given hot moist packs , ultrasound, MET.

## 3. Statistical Analysis

The statistical analysis of non-parametric data (VAS, Shoulder Pain and Disability index scores,) was done by Wilcoxon matched pairs test and Mann-Whitney test.

The statistical analysis of the parametric data (Shoulder ROM) was done using paired 't' and unpaired 't' tests.

#### 4. Results

Age of the participants in this study was between 40-70 years. There was no statistically significant difference between mean age and standard deviation of the participants in two groups. Mean age of Group A was 53.466 years and that Group B was 51.066 years .(Table No.1) out of total 30 participants group A consisted 8 males, 7 females and group B had 8 males and 7 females

**Table 1:** Baseline characteristics of participants

Groups	Gender	Mean Age
Group A	M=8,F=7	53.466 years
Group B	M=8,F=7	51.066 years

The pre-interventional VAS values were  $7.466 \pm 1.1877$  in Group A and  $8 \pm 0.9258$  in Group B respectively, whereas the postinterventional VAS values were  $1.666 \pm 0.4880$  in Group A and  $4.733 \pm 0.7037$  in Group B respectively. ( $p < 0.001$ ) which was statistically extremely significant.(Table.No.2)

**Table 2:** Comparative evaluation of VAS scores within two groups

Group	Pre- treatment		Post-treatment	
	Mean $\pm$ SD	Median	Mean $\pm$ SD	Median
A	$7.466 \pm 1.1877$	8.00	$1.666 \pm 0.4880$	2.00
B	$8 \pm 0.9258$	8.00	$4.733 \pm 0.7037$	5.00
'p'	$(p < 0.001)$		$(p < 0.001)$	

On comparing the pre intervention SPADI score between both the groups there was no statistically significant difference with  $p = 0.5060$ . In Group A, the pre mean SPADI values were  $78.5866 \pm 5.116$  which reduced to a post mean of  $4.71 \pm 9.25$  with  $p < 0.0001$  which was statistically extremely significant. In group B the pre mean SPADI values were and  $80.08 \pm 6.940$  which reduced to post mean of  $52.00 \pm 11.698$  with  $p < 0.0001$  which was statistically extremely significant with  $p < 0.0001$  (Table No 3).

**Table 3:** Comparison of SPADI values in between Groups

Group	Pre- treatment		Post-treatment	
	Mean $\pm$ SD	Median	Mean $\pm$ SD	Median
A	$78.5866 \pm 5.116$	80.110	$4.71 \pm 9.25$	5.100
B	$80.08 \pm 6.940$	83.120	$52.00 \pm 11.698$	55.210
'p'	0.5060		$< 0.0001$	

On comparing the ROM Value for shoulder flexion between both the groups there was no statistically significant difference with  $p = 0.9812$ . The pre-interventional values of ROM were  $103.66 \pm 32.068$ . in Group A and  $103.46 \pm 5.423$  in Group B respectively, whereas post-interventional values of ROM were  $141.33 \pm 19.059$  in Group A and  $117.53 \pm 7.080$  in Group B respectively. Intra Group results showed statistically significant difference in post-intervention values for both the Groups. ( $p < 0.0001$ ). (Table.No.4)

**Table 4:** Comparative evaluation of flexion ROM for both the groups

Group	Pre- treatment		Post-treatment	
	Mean $\pm$ SD	Median	Mean $\pm$ SD	Median
A	$103.66 \pm 32.068$	110	$141.33 \pm 19.059$	140
B	$103.46 \pm 5.423$	103	$117.53 \pm 7.080$	119
'p'	0.9812		$< 0.0001$	

On comparing the ROM Value for shoulder abduction between both the groups there was no statistically significant difference with  $p = 0.0774$ . The pre-interventional values of ROM were  $81.6 \pm 23.67$ . in Group A and  $70.133 \pm 5.125$  in Group B respectively, whereas post-interventional values of ROM were  $129.33 \pm 25.49$  in Group A and  $87.066 \pm 6.573$  in Group B respectively. Intra Group results showed statistically significant difference in post-intervention values for both the Groups. ( $p < 0.0001$ ). (Table.No.5)

**Table 5:** Comparative evaluation of abduction ROM for both the groups

Group	Pre- treatment		Post-treatment	
	Mean $\pm$ SD	Median	Mean $\pm$ SD	Median
A	$81.6 \pm 23.67$	81	$129.33 \pm 25.49$	125
B	$70.133 \pm 5.125$	70	$87.066 \pm 6.573$	90
'p'	0.0774		$< 0.0001$	

On comparing the ROM Value for shoulder internal rotation between both the groups there was no statistically significant difference with  $p = 0.9346$ . The pre-interventional values of ROM were  $41.8 \pm 8.152$ . in Group A and  $41.6 \pm 4.595$  in Group B respectively, whereas post-interventional values of ROM were  $68.8 \pm 7.093$  in Group A and  $54.2 \pm 4.383$  in Group B respectively. Intra Group results showed statistically significant difference in post-intervention values for both the Groups. ( $p < 0.0001$ ). (Table.No.6)

**Table 6:** Comparative evaluation of shoulder internal ROM for both the groups

Group	Pre- treatment		Post-treatment	
	Mean $\pm$ SD	Median	Mean $\pm$ SD	Median
A	$41.8 \pm 8.152$	40	$68.8 \pm 7.093$	70
B	$41.6 \pm 4.595$	42	$54.2 \pm 4.383$	55
'p'	0.9346		$< 0.0001$	

On comparing the ROM Value for shoulder external rotation between both the groups there was no statistically significant difference with  $p = 0.3895$ . The pre-interventional values of ROM were  $23.53 \pm 14.154$ . in Group A and  $27.26 \pm 7.478$  in Group B respectively, whereas post-interventional values of ROM were  $62.73 \pm 12.764$  in Group A and  $43.86 \pm 10.070$  in Group B respectively. Intra Group results showed statistically significant difference in post-intervention values for both the Groups. ( $p < 0.0001$ ). (Table.No.7)

**Table 7:** Comparative evaluation of shoulder external ROM for both the groups

Group	Pre- treatment		Post-treatment	
	Mean $\pm$ SD	Median	Mean $\pm$ SD	Median
A	$23.53 \pm 14.154$	22	$62.73 \pm 12.764$	A
B	$27.26 \pm 7.478$	25	$43.86 \pm 10.070$	B
'p'	0.3895		$< 0.0001$	

## 5. Discussion

The purpose of present study was to find out the effect of muscle energy technique and specific inferior capsular stretching frozen shoulder.

Frozen Shoulder is considered as a serious complication since it restricts the activities of daily living. 30 patients diagnosed as frozen Shoulder of age group 40-70 years approaching to OPD of Krishna College of Physiotherapy participated in the study.

Pretreatment outcome measures for pain intensity, strength and functional disability was done with VAS, ROM, and SPADI score.

In the study the study 30 patients (16 males,14 females) diagnosed with frozen shoulder. In that 8 males in group A and 7 females in group A. and and 8 males in group B and 7 females in group B respectively.

In the study 30 subjects were taken in the study with the age group of 40-70 years in that the mean age group is 53.466 for group A and 51.066 for group B. and the P= 0.4759 and t=0.7229.

In the study 30 subjects were taken in the study with the age group of 40-70 years in that the side affected 8 participants were right side affected and 7 were affected left side in group A. and 10 were affected in right side in group B and 5 were affected left side in group B respectively. The study age group ranges from 40-70 years, which is within the inclusive criteria of the study.

In the study Group A pre-interventional SPADI was 78.5866 whereas post-interventional SPADI was 4.71. Group B pre-interventional SPADI was 80.08 whereas post-interventional SPADI was 52.00. p<0.0001, t=16.186. Intra Group Changes in SPADI score reveals statistically extremely significant and reduction in disability post interventional for both the group.

The study age group ranges from 40-70 years, which is within the inclusive criteria of the study. In the study pre-interventional VAS value was 7.466 and post-interventional VAS value was 1.666. in group A and pre -interventional VAS value was 8 and post-interventional VAS was 4.733. in group B and the P<0.0001 ,T= 13.898. Intra Group Changes in VAS value reveals statistically extremely significant and reduction in disability post interventional for both the group. In the study, the statistical analysis of Internal Rotation the participants from group A and Group B showed extremely significant values.

### • Shoulder Flexion

In the present study pre interventional mean shoulder flexion range was  $103.66 \pm 32.068$  in Group A and  $103.46 \pm 5.423$  in Group B whereas post-interventional mean of shoulder flexion range was  $141.33 \pm 19.059$  in Group A and  $117.53 \pm 7.080$  in Group B respectivel. Intra group statistical analysis revealed statistically extremely significant increase in shoulder flexion range post interventionally for both the groups. This was done by using paired t test Group A (t=7.621, p<0.0001), Group B (t=9.354, p<0.0001).intra

Group Changes in shoulder flexion reveals statistically extremely significant and reduction in disability post interventional for both the group.

### • Shoulder Abduction

In the present study pre interventional mean shoulder abduction range was  $81.6 \pm 23.67$  in Group A and  $70.133 \pm 5.125$  in Group B whereas post-interventional mean of shoulder abduction range was  $129.33 \pm 25.49$  in Group A and  $87.066 \pm 6.573$  in Group B respectively. Intra group statistical analysis revealed statistically extremely significant increase in shoulder abduction range post interventionally for both the groups. This was done by using paired t test Group A (t=7.267, p<0.0001), Group B (t=13.212, p<0.0001). ). intra Group Changes in shoulder abduction reveals statistically extremely significant and reduction in disability post interventional for both the group.

### • Internal Rotation

In the present study pre interventional mean shoulder internal rotation range was  $41.8 \pm 8.152$  in Group A and  $41.6 \pm 4.595$  in Group B whereas post-interventional mean of shoulder internal range was  $68.8 \pm 7.093$  in Group A and  $54.2 \pm 4.383$  in Group B respectively. Intra group statistical analysis revealed statistically extremely significant increase in shoulder internal range post interventionally for both the groups. This was done by using paired t test Group A (t=10.563, p<0.0001), Group B (t=17.242, p<0.0001). Intra Group Changes in shoulder internal rotation reveals statistically extremely significant and reduction in disability post interventional for both the group. In the study, the statistical analysis of Internal Rotation the participants from group A and Group B showed extremely significant values .

### • External Rotation

In the present study pre interventional mean shoulder external rotation range was  $23.53 \pm 14.154$  in Group A and  $27.26 \pm 7.478$  in Group B whereas post-interventional mean of shoulder external rotation range was  $62.73 \pm 12.764$  in Group A and  $43.86 \pm 10.070$  in Group B respectively. Intra group statistical analysis revealed statistically extremely significant increase in external rotation post interventionally for both the groups. This was done by using paired t test Group A (t<sub>14</sub>=8.591, p<0.0001), Group B (t<sub>14</sub>=7.022, p<0.0001).

Use of modalities and other physical agents in patients with frozen shoulder helped in pain relief and muscle relaxation. Hot Moist Fermentation were given which helped in muscle relaxation, pain relief, and control Spasm.<sup>30</sup>

Inferior capsular Stretch and Muscle Energy Technique helps in improving Shoulder ROM. The Benefits of inferior capsular Stretching is the deliberate lengthening of inferior capsule in order to increase joint range of motion. Stretching activities are an important part of any exercises or rehabilitation Program .they help warm the body up prior to activity thus decreasing the risk of injury as well as muscle soreness.<sup>22</sup>

In this study the range of motion has shown significant improvement due to Stretching. Participants of various ages in the study have benefitted from stretching since the

stretching techniques helps in increasing flexibility and joint range of motion, Improve blood circulation to the muscle, helps in maintaining proper posture by preventing muscle tightness. It also helps in decreasing stress.

A hypothesis behind this technique of using counter traction was the concept of axial distraction, which when provided to the shoulder, allows for a greater gain in mobility at the end range. This subsequently increases shoulder mobility. For continuous sustained axial traction, suspended weights by counter traction were used for the affected limb.<sup>22</sup>

The mechanism underlying the improvement in ROM in MET group could be because of reflex Muscle relaxation and tissue texture changes following MET. Muscle relaxation following isometric Contraction is claimed to be mediated by golgi tendon organ with its inhibitory influence on  $\alpha$ -motor neurons pool and by reciprocal inhibition from contraction of muscle antagonist. The stretching which is imparted during the technique is the primary mechanism for increasing muscle length.

According to previous literature on MET our study supports the use of 7 sec. isometric contraction which has found to be effective in improving ROM<sup>20,31</sup>

Range of motion exercises also help to improve joint and soft tissue mobility to minimize loss of tissue flexibility and contracture formation.<sup>32</sup>

Group A received both the approaches compared to group B. The statistical significant improvement in VAS.ROM, and SPADI Score was seen in group A then Group B

## 6. Conclusion

Thus, from the above conducted study it concludes that effect of muscle energy technique and specific inferior capsular stretching had significant improvement clinically and statistically on SPADI score, VAS and ROM thus facilitating functional outcomes.

## 7. Source of Funding

The source of funding for the study is self.

## 8. Conflict of Interest

There is no conflict of interest.

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