

# Effect of Gong's Mobilisation versus Muscle Energy Technique on Pain and Functional Ability of Shoulder in Phase II Adhesive Capsulitis

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## ABSTRACT

**Introduction:** Adhesive capsulitis is a self-limiting condition of unknown aetiology. It is characterised by painful and limited active and passive range of motion. Women are more commonly affected than men. This condition is defined as spontaneous onset of pain and limitation of shoulder range of motion. Manipulation, soft tissue mobilisation techniques, electrotherapy have proved effective in reducing pain, improving the range of motion, thereby increasing the functional ability of shoulder.

**Aim:** The present study focuses on the effectiveness of Gong's mobilisation versus muscle energy technique on pain and functional ability of shoulder in phase II adhesive capsulitis.

**Materials and Methods:** The present cross-sectional study included 50 subjects with the history of adhesive capsulitis (phase II) selected based on the inclusion and exclusion criteria. They were randomly allocated into two study groups. The duration of the treatment intervention was 6 sessions per week for the duration of two weeks. The Gong's mobilisation (Group A) pull was maintained for about 10-15 seconds and a rest period of 5 seconds was given. This technique was performed for about 2-3 minutes. Maitland's grade 3 and 4 was

performed to increase the range which was then followed by sustained stretch at grade 4 for about 5-7 seconds. Muscle energy technique was applied for 5 repetitions per set, 5 sets per session, 1 session per day, 5 days a week for 2 weeks with each repetition maintained for the duration of 7-10 seconds. The outcome measures for the range of motion was goniometer, pain was assessed by using VAS, functional ability by Shoulder Pain And Disability Index (SPADI), after six sessions of treatment for about two weeks.

**Results:** The post-test mean value of range of motion for Group A was 155.56 and for Group B it was 135.40. The mean post test value for VAS for Group A was 2.12 and Group B it was 3.24. The post mean value for SPADI in Group A was 25.28 and Group B 34.80. Based on the above data analysis it is evident that Group A showed significant improvement than Group B. This implies that Gong's mobilisation is more beneficial in improving ROM, reducing pain, improving functional ability.

**Conclusion:** The present study concludes that Gong's mobilisation is more effective than muscle energy technique in subjects with phase II adhesive capsulitis.

**Keywords:** Range of motion, Shoulder pain and disability index, Visual analog scale

## INTRODUCTION

Adhesive Capsulitis is also known as frozen shoulder. It is a condition in which there is pain and stiffness or movement loss in the shoulder. The condition most often affects people between 40-60-year-old and is more common in women. Adhesive Capsulitis occurs as the area around the shoulder joint thickens and contracts. Adhesive capsulitis is more common among people with diabetes and affects 10% to 20% of diabetics. There is a dull or aching pain in the outer shoulder area. Sometimes the pain occurs in the upper arm. Movement of the shoulder is severely restricted, with progressive loss of both active and passive motion. Pain from other conditions such as arthritis, rotator cuff tear, bursitis, or tendinitis can also restrict the range of motion of the shoulder [1].

Pain is usually constant at night and in cold weather. Further movement can provoke tremendous pain and cramping. It is caused by inflammation, such as when the lining of a joint becomes inflamed (synovitis), or by autoimmune reactions. There are generally three stages of pathology in adhesive capsulitis. The first stage is Pre-freezing stage. The onset is usually one to several months, with persistent pain and discomfort with active movements. The pain is acute during the night. Signs of synovitis are noted within the joint without adhesion or contractures. Biopsy of the joint capsule reveals the presence of unusual inflammatory cells, hypertrophic inflammation of the synovial membrane, and normal capsular tissue. The Second Stage "Freezing" usually takes about three

to nine months to develop into frozen shoulder. Usually, there will be an increase in pain during activity, progressive loss of motion, significant stiffness and pain occurring day and night which results in disturbed sleep pattern. The arthroscopic study shows thickening of the synovial membrane and adherence to other soft tissue, and the articulating function of the shoulder joint is less effective. According to pathology, the tissue appear hypertrophic, hypervascular synovitis with perivascular and sub synovial scar formation. The third Stage "Frozen" is also known as 'maturation stage'. This stage lasts for 9-14 months, the intensity of pain dissipates and shoulder movements are restricted. The limitation in range of motion of shoulder is due to swelling and adhering connecting tissue which are evident from the capsular biopsy of the dense hypercellular collagenous tissue, especially at the front of the capsule. In fourth or chronic Stage called as 'Thawing'. Improvements can be noticed with decreased pain and greater-range of motion. Restoration of overhead movement and daily activities occur by 12 to 15 months since the onset of adhesive capsulitis [2]. The shoulder pain and disability index is a self-administered questionnaire which includes pain and disability subscales questions [3].

Gong's mobilisation technique helps to heal physical pain as well as distract the mind from stress. It is a corrective antero-posterior glide applied for shoulder distraction and their restricted movements to decrease pain and to improve range of motion. According to Wontae gong, gong's mobilisation is more effective for anterior to

posterior glide to improve shoulder abduction, external and internal rotation. Joint mobilisation technique is effective to reduce pain and improves range of motion [4]. Muscle energy techniques is a manual therapy that uses the gentle muscle contractions to relax and lengthen muscles and normalise joint motion [5]. It is a class of soft tissue osteopathic manipulation consisting of isometric contraction designed to improve musculoskeletal function and reduce pain [6]. The application of MET relaxes and improves biomechanics and result in improving functional ability [7].

The present study aimed to find out the effect of Gong's Mobilisation versus Muscle Energy Technique on pain and functional ability of shoulder in phase II adhesive capsulitis.

## MATERIALS AND METHODS

The present cross-sectional study was conducted after obtaining the Ethical Clearance from the Institutional Review of ACS medical college and hospital, vellappanchavadi, Chennai, India. The procedures were followed according to the recommendations of Helsinki Declaration of 1964 (as revised in 2008). This study was registered under Faculty of Physiotherapy, Dr. MGR Educational and Research Institute with IRB number (0035/PHYSIO/IRB/2017). The study was carried out from January 2017 to May 2017. The sample size was determined by the current prevalence ratio of adhesive capsulitis [8]. Fifty patients who reported to Outpatient Department of Physiotherapy, ACS Medical College and hospital, SG physiotherapy clinic were selected on the basis of inclusion and exclusion criteria. The Simple random technique was used and they were assigned into Group A and Group B.

Subjects included were clinically diagnosed adhesive capsulitis (phase II), age group between 40-60 years, both males and females, unilateral limb involvement, both dominant and non dominant hand and exclusion criteria included acute inflammation, subjects with systemic disorders, subject with neurological disorders/musculoskeletal disorder, recent fracture in and around the shoulder, recent shoulder dislocation, rheumatoid arthritis, any cardiac pacemakers, skin problem, past surgery around shoulder joint. A detailed demography data, past medical history were collected from the patient. After a detailed explanation of the treatment procedure, an informed consent was obtained. The outcome measure, VAS, SPADI, ROM was recorded before and after the treatment as pre- and post-test score. The treatment was carried out for six sessions for two weeks. Shortwave diathermy was given before mobilisation technique for both groups for 15 minutes.

**Group A:** Gong's Mobilisations; The Gong's mobilisation can be done either in high sitting or in side-lying position with the affected shoulder upward. The subject's shoulder was abducted at 90° so that the humerus was maintained at vertical position. The elbow joint was flexed and maintained at 90°; the therapist maintained this position by placing his/her hand below the subject's elbow. The humeral head was pressed from anterior to posterior direction with the other hand. The therapist held the vertical axis of the humerus by maintaining the shoulder in abduction and the elbow in 90°. The therapist raised his own body by slightly pulling on the anterior capsule and this pull was maintained for 10-15 seconds and then relaxed for five seconds and performed for about two to three minutes. At this moment the subject was asked to perform shoulder abduction with no external rotation, while elbow flexion was maintained throughout. The therapist continuously pressed the humeral head and followed the subject's shoulder abduction movement at the same speed while maintaining distraction and acceleration was added at the end range of motion. Maitland's Grade 3 and 4 was performed in order to further increase the range of motion which was then followed by sustained stretching at Grade 4 for about 5-7 seconds [4].

**Group B:** Muscle energy technique for glenohumeral joint restricted abduction-The therapist stood in front of the patient, then placed

one hand over the top of the subject's involved shoulder. The therapist cups the glenohumeral joint to palpate for motion and the subjects are directed to press the elbow towards their body.

Muscle energy technique for glenohumeral joint restricted internal rotation-The therapist stood facing the patient and then placed the dorsum of the subject's hand of the involved side against the subjects back. The therapist placed one hand over the top of shoulder and also covering superior part of the scapula. The other palm kept protecting anterior side of the shoulder capsule and the other hand placed, posterior to the subject's flexed elbow. The subject was directed to "press their elbow against the therapist's fingers".

Muscle energy technique for glenohumeral joint restricted external rotation-The therapist placed one hand superior to the subject's involved glenohumeral joint and forearm of the other hand placed medial to the subject's flexed forearm. The patient's hand was supported by the therapist hand and the wrist. The subjects were asked to internally rotate the arm by pressing the hand. Muscle energy technique was applied for five repetitions per set, five sets per session, one session per day, five days a week for two weeks with each repetition maintained for the duration of 7-10 seconds [9].

## STATISTICAL ANALYSIS

The collected data were tabulated and analysed using both descriptive and inferential statistics. All the parameters were assessed using Statistical Package for Social Science (SPSS) version 24.0. Paired t-test was adopted to find statistical difference between the groups and Independent t-test (Student's t-test) was adopted to find statistical difference between the groups. p-value <0.005 was considered statistically significant.

## RESULTS

The study was conducted on 50 subjects. In Group A there were 25 subjects on whom the Gong's mobilisation technique was performed, mean age was 51.12±4.6 years and there were 11 males and 14 females. In Group B there were 25 subjects with mean age 49.9±5.9 years, with 11 males and 14 females. There was no significant difference in mean age among both the groups.

All the data shown in [Table/Fig-1] reveals that there was no significant difference in Mean, Standard Deviation (SD), Student t-test, and p-value of the Abduction ROM between (Group A) and (Group B) in pre-test and post test weeks. Both the groups showed significant increase in the post-test means but Group-A (155.56) which had the higher mean value than Group-B (135.40).

Range of Motion	Group-A		Group-B		t-test	Significance
	Mean	SD	Mean	SD		
Pre-test	99.80	15.09	95.60	17.87	0.878	0.384*
Post-test	155.56	19.00	135.40	17.84	0.386	<0.001***

**[Table/Fig-1]:** Comparison of shoulder abduction rom between Group-A and Group-B in Pre- and post-test.  
#Group A : (\*- p>0.05); # Group B: (\*\*- p≤0.001)

There was no significant difference in pre-test values of the shoulder external rotation between Group A (52.80) and Group B (50.20) (\*p>0.05). Both the groups show significant Increase in the post-test Means but Group-A (76.88) which had the higher mean value than Group-B (69.20) [Table/Fig-2].

Range of Motion	Group-A		Group-B		t-test	Significance
	Mean	SD	Mean	SD		
Pre-test	52.80	7.91	50.20	10.94	0.341	0.341*
Post-test	76.88	6.29	69.20	9.96	3.68	<0.001***

**[Table/Fig-2]:** Comparison of shoulder external rotation rom between Group-A and Group-B in pre- and post-test.  
#Group A: (\*- p>0.05); # Group B: (\*\*- p≤0.001)

There was no significant difference in pre-test values of the shoulder internal rotation between Group A (63.60) and Group B (59.80) (\*p> 0.05). Both the groups shows significant Increase in the post-test means but Group-A (77.20) which has the higher mean value is more effective than Group-B (70.60) [Table/Fig-3].

Range Of Motion	Group-A		Group-B		t-test	Significance
	Mean	SD	Mean	SD		
Pre-test	63.60	13.26	59.80	11.94	1.06	0.293*
Post-test	77.20	7.64	70.60	7.54	3.25	<0.001***

**[Table/Fig-3]:** Comparison of shoulder internal rotation rom between Group-A and Group-B In pre- and post-test.  
#Group A: (\*- p>0.05); # Group B: (\*\*\*- p<0.001)

The mean, Standard Deviation (SD), Student t-test, and p-value of the VAS between (Group A) and (Group B) in pre-test and post-test weeks. This table shows that there was no significant difference in pre-test values of the VAS between Group A (6.44) and Group B (6.00) (\*p>0.05). Both the groups show significant decrease in the post test means but Group-A (2.12) which has the lower mean value was more effective than Group-B (3.24) [Table/Fig-4].

Visual Analogue Scale	Group-A		Group-B		t-test	Significance
	Mean	SD	Mean	SD		
Pre-test	6.44	1.23	6.00	0.781	1.32	0.191*
Post-test	2.12	1.19	3.24	1.15	3.83	<0.001***

**[Table/Fig-4]:** Comparison of VAS between Group-A and Group-B in pre- and post-test.  
#Group A: (\*- p> 0.05); # Group B: (\*\*\*- p<0.001)

The [Table/Fig-5] reveals the mean, Standard Deviation (SD), Student t-test, and p-value of the SPADI between (Group A) and (Group B) in pre-test and post-test. This table shows that there was no significant difference in pre-test values of the SPADI between Group A (58.08) and Group B (57.80) (\*p>0.05) and statistically significant difference in post-test values of the SPADI between Group A (25.28) and Group B (34.80) (\*\*\*- p<0.001). Both the groups show significant decrease in the post test means but Group-A (25.28) which has the lower Mean value is more effective than Group-B (34.80).

Shoulder Pain and Disability Index	Group-A		Group-B		t-test	Significance
	Mean	SD	Mean	SD		
Pre-test	58.08	9.29	57.80	7.98	0.114	0.910*
Post-test	25.28	6.79	34.80	6.51	-5.05	<0.001***

**[Table/Fig-5]:** Comparison of SPADI between Group-A and Group-B in pre- and post-test.  
#Group A: (\*- p>0.05); # Group B: (\*\*\*- p<0.001)

The [Table/Fig-6] reveals the Mean, Standard Deviation (SD), t-value and p-value of the ROM, VAS and SPADI between pre-test and post-test within Group A (\*\*\*- p<0.001) There was statistically highly significant difference between the pre-test and post-test values within Group A.

Group A	Pre Test		Post Test		t-test	Significance
	Mean	SD	Mean	SD		
ABD	99.80	15.90	155.56	19.00	-16.75	<0.001***
EXT.ROT	52.80	7.91	76.88	6.29	-17.48	<0.001***
INT.ROT	63.60	13.26	77.20	7.64	-5.00	<0.001***
VAS	6.44	1.15	3.24	1.23	20.94	<0.001***
SPADI	58.08	9.29	25.28	6.79	19.47	<0.001***

**[Table/Fig-6]:** Comparison of ROM, VAS and SPADI within Group A between pre-test and post-test.  
\*Group A: Gong's Mobilisation (\*\*\*- p<0.001)  
EXT.ROT: External rotation; INT.ROT: Internal rotation; VAS: Visual analog scale; SPADI: Shoulder pain and disability index

Group B	Pre Test		Post Test		t-test	Significance
	Mean	SD	Mean	SD		
ABD	95.60	17.87	135.40	17.84	-11.35	<0.001***
EXT.ROT	50.20	10.94	69.20	9.96	-9.81	<0.001***
INT.ROT	59.80	11.94	70.60	7.54	-6.20	<0.001***
VAS	6.00	1.19	2.10	.781	19.90	<0.001***
SPADI	57.80	7.98	34.8	6.51	18.8	<0.001***

**[Table/Fig-7]:** Comparison of ROM, VAS and SPADI within Group B between pre-test and post-test.

\*Group B: Muscle Energy Technique (\*\*\*- p<0.001)  
EXT.ROT: External rotation; INT.ROT: Internal rotation; VAS: Visual analog scale; SPADI: Shoulder pain and disability index

The above [Table/Fig-7] reveals the mean, Standard Deviation (SD), t-value and p-value of the ROM, VAS and SPADI between pre-test and post-test within Group B (\*\*\*- p<0.001)

There is statistically highly significant difference between the pre-test and post-test values within Group-B. In Abduction Group B pre-test values were (95.60) and post values were (135.40), External rotation between pre-test and post-test values were (50.20) and (69.20), internal rotation between pre-test and post-test values were (59.80) and (70.60), VAS scale between pre-test and post-test values were (6.00) and (2.10), SPADI were based on between pre-test and post-test values were (57.80) and (34.08) (\*\*\*- p<0.001).

## DISCUSSION

The purpose of the present study was to determine whether there was any clinical benefit of Gong's mobilisation versus muscle energy technique on functional ability of shoulder in phase II adhesive capsulitis. The results of the study demonstrated that Group A showed significant changes due to the application of Gong's mobilisation thereby improving ROM than Group B. There was substantial improvement observed during the four weeks of the treatment period in both the groups. However, significant results were found in Group A (Gong's mobilisation). The data showed that with the use of two weeks protocol there was a significant difference between post-treatment values of shoulder pain and disability index scale and visual analogue scale. Gong's mobilisation provides immediate effect and it does not require external rotation to improve abduction which can be helpful in frozen shoulder patient where marked limitation of external rotation present. Dillip JR and Akalwadi A, concluded that both Gong's mobilisation with conventional therapy and Mulligan's mobilisation with conventional therapy are effective in reducing pain and improving shoulder medial rotation mobility in frozen shoulder. However, Gong's mobilisation showed a greater percentage of effect in reducing pain and Mulligan's Mobilisation showed greater percentage in improving ROM [4]. According to Gong W et al., the rolling and sliding of the humeral head must happen amicably. In any case, typical rolling and sliding were troublesome on the grounds that the humeral head was regularly medially turned and dragged forward because of the pectoralis major and the subscapularis muscle. As indicated in his study, Gong's mobilisation was not typical with AP glide, because in the latter technique, humeral head is pushed back to their normal position. This normal position of the humeral head can be held only during static position and fail during dynamic position. However, Gong's techniques restore and maintain the humeral head both in static and dynamic position. Hence, this technique was considered to be more effective than anteroposterior glide [10,11] Muscle energy technique is applied to shoulder external rotators, internal rotators and abduction to reduce capsular tightness and improve range of motion. It is mainly used for individuals for back, neck, and shoulder pain, etc. However, in the current study the data supported Gong's mobilisation technique statistically. This technique helps to heal physical pain. It is applied as a gliding technique in anteroposterior direction. This glide is more effective in reducing pain and improving ROM according to Gong W et al., [12].

## LIMITATION

The limitation of the present study is the small sample size. In future studies with larger sample size, including other phases of Adhesive capsulitis can be included and longer duration of treatment can be done.

## CONCLUSION

The present study concluded that the Gong's mobilisation technique was very much effective in improving functional ability of shoulder than muscle energy technique in subjects with Phase II adhesive capsulitis. The study reveals that there is a significant difference between Group A Gong's Mobilisation and Group B Muscle Energy Technique in the management of subjects with phase II adhesive capsulitis.

## ACKNOWLEDGEMENTS

The authors would like to thank the management of Dr. MGR Educational and Research Institute University and Faculty of Physiotherapy for providing the necessary infrastructure to complete the present study.

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Date of Submission: **Nov 09, 2017**  
Date of Peer Review: **Feb 05, 2018**  
Date of Acceptance: **Jul 02, 2018**  
Date of Publishing: **Sep 01, 2018**

FINANCIAL OR OTHER COMPETING INTERESTS: None.