

**“EFFECTIVENESS OF CONVENTIONAL THERAPY WITH
CAPSULAR STRETCHING VERSUS MUSCLE ENERGY
TECHNIQUE IN THE MANAGEMENT OF FROZEN SHOULDER
A COMPARATIVE STUDY”**

*A Dissertation Submitted in the partial fulfillment of the requirement for the
Degree of*

**MASTER OF PHYSIOTHERAPY
With specialization in
ADVANCED PHYSIOTHERAPY IN ORTHOPAEDICS**



**Submitted by
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Submitted to**

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SHANMUGA COLLEGE OF PHYSIOTHERAPY
(AFFILIATED TO THE TAMILNADU Dr. M.G.R. MEDICAL
UNIVERSITY)

SALEM.

CERTIFICATE

This is to certify that the project entitled a report on **“EFFECTIVENESS OF CONVENTIONAL THERAPY WITH CAPSULAR STRETCHING VERSUS MUSCLE ENERGY TECHNIQUE IN THE MANAGEMENT OF FROZEN SHOULDER A COMPARATIVE STUDY”** submitted by **Reg. No: 27082401** is a bonafide work done in the partial fulfillment of requirement for the **MASTER OF PHYSIOTHERAPY** course with Advanced Physiotherapy in Orthopedics as Specialization of The Tamilnadu Dr. M.G.R. Medical University, Chennai – 32.

Guide

Principal

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1. INTRODUCTION

The shoulder is the most movable but unstable joint in the body because of the range of motion it allows. It is easily subject to injury because the ball of the upper arm is larger than the socket that holds it. To remain stable, its muscles, tendons and ligaments must anchor the shoulder. Shoulder stiffness is a poorly understood disorder of the glenohumeral joint and Frozen shoulder is a pathology of often unknown etiology characterized by painful and gradually progressive restriction of active and passive gleno-humeral joint motion (Baslund et al,1990; Pearsall and Speer,1998).

Approximately 2-3% of adults aged between 40 and 70 years develop frozen shoulder with a greater occurrence women (Anton, 1993,Connolly, 1998; Stam, 1994). partly due to the use of confusing terminology. Over the years, the stiff shoulder was labeled initially periartthritis by Duplay in 1872, then frozen shoulder by Codman in 1934 and later adhesive capsulitis by Neviasser in 1945.

Codman described the disorder known as frozen shoulder as a "condition difficult to define, difficult to treat and difficult to explain from the point of view of pathology.

Neviaser was the first to recognize "a chronic inflammatory process" that resulted in capsular fibrosis, or thickening and contracture of the capsule. Some of the more common terms that are synonyms for frozen shoulder are adhesive capsulitis, peri-arthritis, stiff and painful shoulder, periarticular adhesions, Duplay's disease, scapulohumeral peri-arthritis, tendinitis of the short rotators, adherent subacromial bursitis, painful stiff shoulder, bicipital tenosynovitis, subdeltoid bursitis, humeroscapular fibrositis, shoulder portion of the shoulder of the shoulder hand syndrome, bursitis calcarea, supraspinatus tendinitis, periarthrosis humeroscapularis, and a host of foreign language terms. Periarthritis covers a large group of disorders including tendonitis and tears of the rotator cuff, calcifying tendinitis, bursitis. Therefore, this is not an acceptable term and frozen shoulder and adhesive capsulitis are the preferred terms.

The debate continues as to whether inflammation or fibrosis is the primary pathologic process underlying frozen shoulder. It is generally well accepted that this process whatever it is, is localized to the joint capsule to

include synovial lining and subsynovial tissue. Neviasser and Lundberg observed the role of inflammation in the development of frozen shoulder. The reason for this histologically observed inflammatory reaction is unclear. It has been hypothesized that it could represent a response to injury, an infectious agent, a chemical mediation, or an autoimmune reaction.

Cytokines seem to have a primary role in the inflammatory reaction and subsequent capsular fibrosis. The role of cytokines in the initiation of inflammation is well known and it has been shown that the sustained production of these substances can result in fibrosis by stimulating fibroblasts. Radeo et al observed the role of specific cytokines (platelet derived growth factor, transforming growth factor- β and hepatocyte growth factor) in the inflammatory and fibrosing cascades specifically in frozen shoulder, primary and secondary forms. The initial trigger resulting in the proposed inflammatory cascade and subsequent fibrosis is still unknown.

Based on the etiology frozen shoulders can be classified as primary or secondary. Primary frozen shoulder is an idiopathic condition, where the exact underlying cause is not known. Frozen shoulder associated with a known underlying disorder is considered to be secondary.

Zuckerman and Cuomo have separated secondary frozen shoulder into intrinsic, extrinsic and systemic categories. Intrinsic shoulder abnormalities include rotator cuff tendinitis, rotator cuff tears, tendinitis of the long head of the biceps tendon, calcific tendinitis and acromioclavicular joint arthritis. Extrinsic disorders which represent pathologic conditions remote from the shoulder region, include ischemic heart disease and myocardial infarction, pulmonary disorders including tuberculosis, chronic bronchitis, emphysema, and tumor, cervical disc disease and radiculopathy, cerebral vascular hemorrhage, previous coronary artery bypass graft surgery, previous breast surgery, lesions of the middle humerus, and central nervous system disorders, such as Parkinson's disease. Extrinsic causes refer to the posttraumatic category, which can be iatrogenic (post surgical) or may result from high-impact forces or low-level activity. Systemic disorders represent generalized medical conditions that are known to occur in association with frozen shoulder which include diabetes mellitus, hypothyroidism, hyperthyroidism, and hypoadrenalism. pain and stiffness are common presenting symptoms in, patients who seek evaluation from musculoskeletal physicians.

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of disorders including tendonitis and tears of the rotator cuff, calcifying tendonitis and bursitis. Therefore, this is not an acceptable term and frozen shoulder and adhesive capsulitis are the preferred terms. Painful and incomplete external rotation is the first distinguishing feature of frozen shoulder. It shows an entirely normal radiographic appearance of the shoulder. Limitation of passive movement in the shoulder can only be caused by two things firstly, irregularity of the joint surface, as is found in arthritis and locked dislocation and secondly contracture of the ligaments that bind the humerus to the glenoid.

STAGES OF FROZEN SHOULDER

Neviaser and Neviaser described the arthroscopic stages of frozen shoulder Stages of Frozen Shoulder.

STAGE 1

Here, the symptoms last for duration of 3 months and there will be pain with active and passive range of motion. There will be limitation of forward flexion, abduction, internal rotation and external rotation. Examination with the patient under anesthesia reveals normal or minimal loss of range of motion. Arthroscopy reveals diffuse glenohumeral synovitis, which is often more, pronounced in the anterosuperior capsule.

STAGE 2

Is also known as the freezing stage and it lasts for 3 to 9 months. The pain will be of chronic nature with both active and passive movements. There will be significant limitation of forward flexion, abduction, internal rotation and external rotation. The pain is very difficult for the patient to localize. The movement restriction may have begun and the restriction is usually in both active and passive range of motion. The patient often reports an impairment of a normal daily activity such as combing hair, fastening a bra strap, putting on a coat, etc. The pain most often interrupts sleep and sleeping on the affected side is impossible.

STAGE 3

This stage is also known as the "frozen stage". The symptoms last for duration of 9-15 months. The pain will be minimal except at the end range of motion. There will be significant limitation of range of motion with rigid "end feel". In this stage the primary restriction pattern is external rotation, abduction, followed by internal rotation.

STAGE 4

This stage is known as "thawing phase" in which there will be minimal pain and it lasts for duration of 15-24 months. The total course of the disorder has been reported to self-resolve in 18 to 24 months. The

diagnosis of idiopathic frozen shoulder is made when other causes of pain and motion loss are eliminated.

Determining from the history which stage a patient is vital to determine the appropriate treatment the early presentation. Identifying associated factors in a patient's medical history and other medical conditions that may contribute to shoulder stiffness is important in determining a diagnosis of idiopathic frozen shoulder. It is suggested that the diagnosis of frozen shoulder be one of exclusion (i.e, other conditions should be ruled out before identifying the condition as frozen shoulder). The conditions regarded as subgroups under the term periarthritits should be eliminated before the term frozen shoulder is applied. Therefore, the term frozen shoulder should be reserved for limitation of specific active and passive range of motion that is due to no known underlying disorder. If an underlying disorder is found and frozen shoulder is present a qualification as secondary frozen shoulder be given.

The physical examination helps to identify secondary causes of frozen shoulder and other diagnoses that may mimic symptoms suggesting frozen shoulder and to document shoulder range of motion. Adequate documentation of the range of motion is important in assessing the resolution or progression of shoulder stiffness. The examination should not

be limited to the symptomatic shoulder but should include the opposite shoulder, cervical spine, and trunk.

A thorough neurologic and vascular examination of the upper extremities is imperative to evaluate for radiculopathy or vascular causes of shoulder pain. The examination should include measurements of forward elevation, external rotation at the side, external and internal rotation in abduction (preferably at 90° of abduction or maximal abduction if the patient cannot reach 90), internal rotation up the back, and cross-body adduction.

A limitation of external rotation with the arm in abduction typically is associated with an antero inferior capsular restriction, whereas limited internal rotation and limited cross-body adduction are associated with a posterior capsular restriction. Plain radiographs usually are normal in frozen shoulder, although they may show osteopenia usually secondary to disuse and are helpful in identifying other causes of shoulder stiffness and pain, such as osteoarthritis and tumor. More advanced imaging techniques are not routinely necessary in the evaluation of the stiff shoulder but are helpful in determining alternative treatment if the patient is not improving with the typical rehabilitation program.

The types of treatment have included benign neglect, chiropractic manipulation, oral corticosteroids, physical therapy exercises and modalities, brisement, manipulation under anesthesia and arthroscopic and open releases of the contracture. Recent studies have emphasized the surgical management of recalcitrant shoulder stiffness. Many of these studies have been flawed because they have lacked objective and subjective outcome criteria.¹⁰ Non-steroidal anti-inflammatory drugs, local anaesthetic and corticosteroid injections into the glenohumeral joint, calcitonin and antidepressants, distension arthrography, closed manipulation, physical therapy modalities and stretching exercises can be listed among the most common non-surgical approaches to treatment in frozen shoulder.

Identifying the stage of frozen shoulder in which a patient is presenting is important to determine the appropriate treatment regimen. Exercise is the key to any treatment protocol for frozen shoulder. In this study the treatment for frozen shoulder mainly consists of Capsular stretching and Muscle energy technique.

CAPSULAR STRETCHING

The glenohumeral joint capsule has a significant degree of inherent laxity with a surface area that is twice that of the humeral head. This

redundancy allows for a wide range of motion. This redundancy allows for a wide range of motion. Medially, the capsule attaches both directly onto (anteroinferiorly) and beyond the glenoid labrum and laterally it reaches to the anatomical neck of the humerus. Superiorly, it is attached at the base of the coracoid, enveloping the long head of the biceps tendon and making it an intraarticular structure.

The capsule also has a stabilizing role tightening with various arm positions. In adduction, the capsule is taut superiorly and lax inferiorly; with abduction of the upper extremity this relationship is reversed and inferior capsule tightens. As the arm is externally rotated, the anterior capsule tightens while internal rotation induces tightening posteriorly. The posterior capsule in particular has been shown to be crucial in maintaining glenohumeral stability, acting as a secondary restraint to anterior dislocation (particularly in positions of abduction) as well as acting as a primary posterior stabilizing structure.

On Pathologic examination of the shoulder joint capsule, in frozen shoulder the joint tends to be contracted, thickened and closely adherent to the humeral head, contributing to the limitation of movement.¹³In frozen shoulder, limitation of external rotation with the arm in abduction typically is associated with an anteroinferior capsular restriction, whereas limited

internal rotation and cross-body adduction are associated with a posterior capsular restriction. The capsular pattern is designated by a hard end-feel and limitation of all three passive movements in fixed proportions. Limitation of medial rotation is slight; the patient cannot fully put her arm behind her back.

The restriction of glenohumeral abduction is more pronounced, but it is impairment of lateral rotation that is most marked. In a case of medium severity, medial rotation would be limited by some 10-15 degrees, glenohumeral abduction by about 45 degrees and lateral rotation by 60-70 degrees. In a very mild attack, medial rotation is full but painful and the other limitations amount to between 10 and 30 and some 45 degrees respectively. The treatment of frozen shoulder should initially be conservative, with the emphasis on passive stretching of the capsular structures. Stretching for the anterior, inferior and posterior shoulder should be performed by the patient as a part of the motion programme.¹⁶ Stretching a frozen shoulder can be painful but stretching slightly past the point of pain is necessary to make forward progression in range of motion.

MUSCLE ENERGY TECHNIQUE

Is a direct hands-on therapy originally developed by Dr. Fred Mitchell, Sr. Osteopathic physician, and continued by Dr. Fred Mitchell, Jr.

It utilizes the patient's own gentle muscle contractions and body positioning to normalize joint motion. It is a non-invasive technique that can be used to lengthen a shortened contracted or spastic muscle; to strengthen a physiologically weakened muscle or group of muscles; to reduce localized oedema to relieve passive congestion and to mobilize an articulation with restricted mobility.

Muscle energy technique targets the soft tissues primarily, but it also makes a major contribution towards joint mobilization. According to Bourdillon much of the joint restriction is a result of muscular tightness and shortening. When damage to the soft or hard tissues of a joint is a factor, the periarticular and osteophytic changes are the major limiting factor in joint restrictions. However, in both situations muscle energy technique may be useful.

In treating joint restriction with muscle energy technique Sandra Yates in 1991 has suggested the following simple criteria to be maintained:

1. The joint should be positioned at its physiological barrier-specific in three planes.
2. The patient should be asked to statically contract muscles towards their freedom of motion away from the barrier of restriction the operator resists totally any movement of the part, the contraction held for 10 seconds.

3. The patient is asked to relax for 2 seconds or so between the contraction efforts, at which time, 4. The operator re-engages the joint at its new motion barrier. Muscle Energy Techniques are used to mobilize joint dysfunctions of both the spine and peripheral joints. When a joint becomes "locked up" or moves out of neutral position, this technique can work well to restore proper joint space.

UNIVERSITY OF CALIFORNIA LOS ANGELES SHOULDER SCORE

The UCLA (University of California at Los Angeles) Shoulder rating score is used to measure the outcomes. This includes five points namely pain, function, active forward flexion, strength of forward flexion (Manual muscle testing) and satisfaction of patient. These are measured prior and also after the treatment technique.

Pain, function and satisfaction of patient is measured by asking simple questions from the scale to the patient and noted the scores. ROM of shoulder forward flexion is measured by using universal double armed goniometer. Strength of muscle for shoulder forward flexion is measured by manual muscle testing (Lovette)

AIM OF THE STUDY:

To compare the effectiveness of Conventional therapy with capsular stretching versus Muscle energy technique in the management of frozen shoulder.

OBJECTIVES OF THE STUDY:

- To find out the effectiveness of conventional therapy with capsular stretching on frozen shoulder.
- To find out the effectiveness of conventional therapy with muscle energy technique on frozen shoulder.
- To compare the effectiveness of conventional therapy with capsular stretching exercises over muscle energy technique in the management of frozen shoulder.

HYPOTHESIS

NULL HYPOTHESIS

There will not be any significant difference between Conventional therapy with Capsular stretching versus Muscle Energy Technique in the management of frozen shoulder.

ALTERNATE HYPOTHESES

There will be significant difference between Conventional therapy with Capsular stretching versus Muscle Energy Technique in the management of frozen shoulder.

2. REVIEW OF LITERATURE

❖ **KRIPA (2004)**

They conducted a comparative study on 60 patients with frozen shoulder. 30 patients were treated with capsular stretching and 30 patients were treated with MET for the duration of 4 weeks. University of Pennsylvania score (1st subset) were considered for assessment and analysis, at the end of the study they concluded that the capsular stretching is found to be effective when compared with MET.

❖ **FUSUN GULER et., al (2004)**

They conducted an experimental study on 50 patients with frozen shoulder for a period of 4 weeks and mentioned that non steroidal anti-inflammatory drugs, local anaesthetic and corticosteroid injections into the glenohumeral joint, calcitonin and antidepressants, distension arthrography, closed manipulation, physical therapy modalities and stretching exercises are the most common non-surgical approaches to treatment in frozen shoulder.

❖ **M.A.HARRAST, ANITA G.RAO (2004)**

They performed an experimental study on 36 patients with frozen shoulder for the duration of 3 weeks have mentioned the use of a typical exercise program of active and passive stretching with the goal of maintaining and regaining range of motion. The basis of this program is four-quadrant stretching of shoulder joint capsule which includes forward flexion, internal rotation, external rotation and cross-body adduction. These exercises should be prescribed 4-5 times daily in the supine position in order to stabilize the scapula and stretch the glenohumeral joint capsule. Stretching slightly past the point of pain is necessary to make forward progression in range of motion. At the initiation of the exercise, application of heat can be helpful to reduce pain and facilitate stretching. After stretching, ice application can help reduce inflammation and irritation.

❖ **CAPTAIN ERIC WILSON et., al (2003)**

They conducted an experimental study with 40 patients and reported that MET combined with supervised neuromuscular re-education and resistance exercises may be superior to supervised neuromuscular re-education and resistance exercises alone for decreasing disability and improving function in patients with low back pain.

❖ **GRIGGS et., al (2000)**

They performed a randomized control trial with 60 patients and reported that following a physical therapy programme consisting of passive stretching exercises (forward elevation, external rotation, horizontal adduction and internal rotation) at a mean follow-up of 22 months, patients demonstrated a reduction in pain score from 1-57 to 1-16 in a range from one to five points, improvements in active range of motion, and 64 patients (90%) reported a satisfactory outcome.

❖ **FRANCES CUOMO (1999)**

They conducted an experimental study with randomly selected 30 patients those who having primary or secondary frozen shoulders with stiffness of less than 6 months and or no previous treatment. Each patient should begin an active-assisted range of motion exercise program complying with gentle, passive, stretching exercises. These exercises should be performed four to five times daily, including forward elevation, internal and external rotation and cross body adduction. And they concluded that the stretching exercise gives beneficial effects in the improvement of pain and ROM.

❖ **RICHARD W NUTTON et., al (2006)**

Conducted a study on 49 patients who had arthroscopic sub acromial decompression for chronic rotator cuff impingement and measured the shoulder function using UCLA Shoulder rating score to find outcome results of shoulder functions.

❖ **BENZAMINA.GOLDBERG et., al (1999)**

They conducted a study on randomly selected 56 patients with frozen shoulder for duration of 30 days and reported that when capsular stretching the anterior capsule tightens during external rotation and the posterior capsule tightens with internal rotation and cross body adduction.

❖ **HELEN OWENS (1997)**

Conducted a study on 42 subjects with frozen shoulder for the period of 3 weeks to find out the use of cryotherapy in frozen shoulder. Cryotherapy, like cold pack application, produces initial vasoconstriction and followed by vasodilatation. They concluded that Ice can be beneficial in reducing any post exercise soreness.

❖ **MAO et., al (1997)**

They conducted a study on 40 patients with frozen shoulder and reported statistically significant improvements in gleno humeral active range of motion in subjects managed with 12 to 18 sessions of physical therapy including moist heat, ultrasound, passive joint mobilizations, and flexibility and strengthening exercises.

❖ **SCHENK et., al (1997)**

Performed a randomized controlled trial to determine the effectiveness of MET for increasing lumbar extension in asymptomatic individuals with each session lasting less than 5 minutes with each subject receiving 4 repetitions of the MET maneuver two times a week for four weeks and reported a statistically significant difference ($p < 0.5$) in the increase of lumbar extension in the increase of lumbar extension in the experimental group.

❖ **PETRIQUIN (1992), SPENCER (1916)**

Mentioned that Spencer sequence offers precise evaluation of even minor restriction in shoulder range and quality of motion, with the added advantage of allowing treatment from the test position. Over the years the

sequence of assessment has been modified to include treatment elements other than the original mobilization intent which includes MET. And concluded that MET gives beneficial outcome in improving ROM in patients with frozen shoulder.

❖ **P.E.GREENMANIN (1989)**

Performed an experimental study on 56 patients with various muscle tightness and concluded that MET can be used to lengthen a shortened, contracted or spastic muscle; to strengthen a physiologically weakened muscle or group of muscles; to reduce localized edema, to relieve congestion, and to mobilize an articulation with restricted mobility.

❖ **VLADIMIR JANDA (1988)**

They conducted an experimental study on joint manipulation and acknowledge that it is not known whether dysfunction of muscles causes joint dysfunction or vice versa, he points out to the undoubted fact that they massively influence each other. He concluded that normalization of the muscle tone by muscle energy technique provides an equally useful basis for joint manipulation.

3. MATERIALS AND METHODOLOGY

MATERIALS:

1. Treatment couch
2. Towels
3. Moist pack
4. Universal double arm (360°) goniometer
5. Cold pack
6. UCLA Shoulder Rating Score

METHODOLOGY

STUDY DESIGN:

Experimental –Comparative study

STUDY SETTING:

This Study was conducted at the Department of Physiotherapy Shanmuga Institute of Post graduate Medical Sciences, Salem-7 under the supervision of concerned authority.

STUDY SAMPLING

Simple random sampling.

SAMPLING PROCEDURE:

A total number of 60 subjects were screened out of which 20 subjects were selected for the study. Each patient was screened initially by using a simple selection proforma relevant to the inclusion and exclusion criteria. Those who fulfilled these symptomatic criteria underwent a detailed physical examination of the shoulder for baseline assessment. Then the selected patients who were willing to participate were randomly divided into two groups of 10 each in Group A and Group B. The details and the purpose of the study were explained to all the patients and informed consent was obtained and demographic data were collected from each patient.

Group A:

Subjects of frozen shoulder (8 females and 2 males) were treated with heat therapy, capsular stretching and icing.

Group B:

Subjects with frozen shoulder (6 males and 4 females) were treated with heat therapy, muscle energy technique and icing.

STUDY DURATION: 4 weeks

INCLUSION CRITERIA

1. Patients with stage 2 or stage 3 frozen shoulders.
2. Age: 25 to 45 years.
3. Gender Both Male and Female.

EXCLUSION CRITERIA

1. Patients who have undergone a surgical procedure of the shoulder less than 4 weeks prior to study enrollment.
2. Patients who have undergone total shoulder arthroplasty.
3. Patients with reflex sympathetic dystrophy.
4. Patients with rheumatoid arthritis.
5. Patients with glenohumeral arthritis.
6. Patients with neoplasms in and around the shoulder joint.
7. Patients with cervical pathology.

SELECTION CRITERIA:

Based on Clinical findings and investigation.

PARAMETER:

UCLA Shoulder rating Score: University of California Los Angeles

The UCLA Shoulder rating Score includes five Sections namely pain, function, active forward flexion, Strength of forward flexion (Manual muscle testing), satisfaction of patient.

The maximum score includes all the five sections are 35 points. The scores > 27 is good /excellent indicates satisfactory results, where the scores < 27 is fair / poor indicates unsatisfactory results.

UCLA Shoulder rating scale

Clinician's name (or ref) Patient's name (or ref)

Please answer the following questions.

During the past 4 weeks.....

Section 1 – Pain

Section 2 - Function

1 Present always and unbearable;
strong medication frequently

1 Unable to use limb

2 Present always but bearable'
strong medication occasionally

2 Only light activities possible

4 None or little at rest' present

4 Able to do light housework or

during light activities; salicylates used frequently

most activities of daily living

6 Present during heavy or particular activities only; salicylates used occasionally

Most housework, shopping, and driving possible; able to do hair and to dress and undress, including fastening bra

8 Occasional and slight

8 Slight restriction only; able to work above shoulder level

10 None

10 Normal activities

Section 3 - Active forward flexion

Section 4-Strength of forward flexion (manual muscle testing)

5 150°

5 Grade 5 (normal)

4 120°-150°

4 Grade 4 (good)

3 90°-120°

3 Grade 3 (fair)

2 45°-90°

2 Grade 2 (poor)

1 30°-45°

1 Grade (muscle concentration)

0 <30°

0 Grade 0 (nothing)

Section 5 – Satisfaction of Patient

The UCLA Shoulder score is ___

5 Satisfied and better

0 Not satisfied and worse

Interpreting the UCLA Shoulder rating scale

>27

Good/Excellent

<27

Fair/Poor

The maximum score is 35 points. Excellent / good indicates satisfactory results, where as fair / poor indicates unsatisfactory results.

In UCLA Score pain, function and satisfaction is measured by asking simple questions from the scale to the patients and note the scores.

Testing protocol for ROM Shoulder flexion

Subjects were positioned in supine with the knees flexed to flatten the

lumbar spine. The shoulder was positioned in 0 degree of abduction, adduction and rotation. The forearm was positioned in 0 degree of supination and pronation so that the palm of the hand faces the body. The scapula was stabilized to prevent elevation posterior tilting (inferior angle presses against the rib cage) and upward rotation and thorax was stabilized to prevent extension of the spine. Initially end feel was tested to measure flexion. The fulcrum of the goniometer was flexed close to the acromial process. The midaxillary line of the thorax and lateral epicondyle of the humerus were used as reference.

Testing protocol for Muscle strength of Shoulder flexion

By using Lovette manual muscle power grading the strength of Shoulder flexion is assessed accordingly,

Grade - 0 Nothing (No contraction).

Grade - I Muscle contraction (flickering of contraction).

Grade - II Poor (full range of motion with elimination of gravity).

Grade - III Fair (full range of motion with against gravity).

Grade - IV Good (full range of motion against gravity with minimal resistance.

Grade - V Normal(full range of motion against gravity with maximal resistance.



Fig No.1.Shoulder ROM measurement.



Fig No.2.Muscle Power assessment

PROCEDURE:

A total of 20 subjects for Inclusion and Exclusion criteria were selected randomly with informed consent. Prior to the treatment program, patients disability status was assessed by UCLA Shoulder rating Score.

Group A:

Subjects received treatment with moist pack for 10 minutes followed by capsular stretching for the anterior, inferior and posterior capsules of the shoulder.

To stretch the anterior capsule the subject was positioned either in side lying with the affected arm upwards or in high sitting and the shoulder and arms were brought backwards into extension and this stretch was maintained for a minimum of 30 seconds and maximum duration up to the point of pain experienced by the patient.

Posterior capsule stretching was performed with the subject in supine position and therapist performing cross body adduction.

Antero- inferior capsule was stretched with the subject in supine position. To stretch the antero inferior capsule the affected arm is taken towards the extreme of attainable elevation and counter pressure is maintained at the patient's sternum to prevent spinal extension.

Each stress is gentle but firm and not released until pain rather than discomfort is experienced.

Group A received capsular stretching of 5 repetitions per set, 5 sets per session, 1 session per day and 5 days a week for 2 weeks. Capsular stretching was followed by 10 minutes of icing to prevent post exercise muscle soreness. For abduction, flexion, extension, and rotation restriction which were again followed by icing for 10 minutes. Subjects were positioned in the lateral recumbent position with the involved upper extremity upper most.

Group B

Subjects received treatment with moist pack for 10 minutes followed by muscle energy techniques for the shoulder joint of 5 repetitions per set, 5 sets per session, 1 session per day, 5 days a week for 2 weeks with each repetition maintained for duration of 7 – 10 seconds.

MET for G.H. joint restricted flexion, Therapist stands in front of the patient and places one hand over the top of the patient's shoulder at the superior part of the scapula and cups the G.H. joint to palpate for motion, the other hand and forearm support the patient's flexed elbow and flex the humerus at the G.H. joint in the sagittal plane up to the initial point of resistance. Direct the patient to extend the elbow against your equal counterforce. Maintain the forces for 3-5 seconds allow the patient to relax

for 2 seconds, take up the slack and then repeat.

MET for G.H. joint restricted extension, therapist stands in front of the patient and places one hand over the top of the patient's shoulder at the superior part of the scapula and cups the G.H. joint to palpate for motion. Uses the other hand to support patient's flexed elbow and direct the patient to push the elbow anteriorly.

MET for G.H. joint restricted abduction, therapist stands in front of the patient, places her one hand over the top of patient's shoulder, cups the G.H. joint to palpate for motion. Direct the patient to press the elbow towards the body.

MET for G.H. joint restricted internal rotation, therapist stands facing the patient. Carefully place the dorsum of the patient's hand against the patients back, therapist places his hand over the top of shoulder and superior part of the scapula and palm protecting anterior side of the shoulder capsule. Places his other hand posterior to the patient's flexed elbow direct the patient "Press your elbow against my fingers".

MET for G.H. joint restricted external rotation, therapist stands behind the patient. Places his hand superior to the patient's GH joint. Places his forearm of the other hand medial to the patient's flexed forearm with his hand supporting the patient's hand and the wrist. direct the patient to internally rotate the arm by pressing the hand.

MET followed by 10 minutes of icing to prevent post exercise muscle soreness.

At the end of the session the patients are assessed by using UCLA Scores and the readings were computed to compare the effectiveness of capsular Stretching and MET in the management of Frozen Shoulder.



Fig No.3.Capsular stretching



Fig No.4.Muscle Energy technique

STATISTICAL TOOL

The statistical tools used in this study were paired t-test and unpaired t-test. The paired t-test used to find out a statistical significance between pre-test and post-test of patients treated with capsular Stretching and muscle energy technique on group A and group B individually.

Paired t-test:

$$S = \sqrt{\frac{\sum d^2 - (\sum d)^2/n}{n-1}}$$

$$t = \frac{\bar{d} \sqrt{n}}{s}$$

\bar{d} = mean difference

n= total number of subjects

s=standard deviation.

Unpaired t-test

The unpaired t-test was used to compare the statistically significant difference between Group A and Group B.

The unpaired t-test is used to compare the statistical significant between Group A and Group B.

$$S = \sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1 + n_2 - 2}}$$

N_1 =total number of subjects in Group A

N_2 =mean difference between pretest/post test Group B.

$$t = \frac{|\bar{x}_1 - \bar{x}_2|}{s \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

\bar{x}_1 = mean difference between pre-test/post-test of Group A.

\bar{x}_2 = mean difference between pre-test/post-test of Group B.

4. DATA PRESENTATION

Pre test and post test values of Group –A (capsular Stretching) using

UCLA Shoulder scale :

Group –A - UCLA Shoulder rating scale :

Table - 1

No of Patients	Pre-test	Post-test
1	19	29
2	17	27
3	22	31
4	25	29
5	24	32
6	21	28
7	17	29
8	16	27
9	19	26
10	18	29

Pre test and post test values of Group –B (MET) using

UCLA Shoulder rating scale:

Group – B - UCLA Shoulder rating scale:

Table - 2

No of Patients	Pre-test	Post-test
1	20	26
2	19	25
3	22	27
4	21	29
5	18	27
6	19	23
7	24	29
8	25	30
9	17	24
10	18	25

5. DATA ANALYSIS AND INTETRPRETATIION

DATA ANALYSIS OF PRE AND POST TEST VALUES OF GROUP A

This chapter deals with analysis and interpretation of data collected from 20 patients with frozen shoulder. The value of UCLA Score is used to compare the efficacy of Capsular Stretching versus MET in the management of Frozen Shoulder.

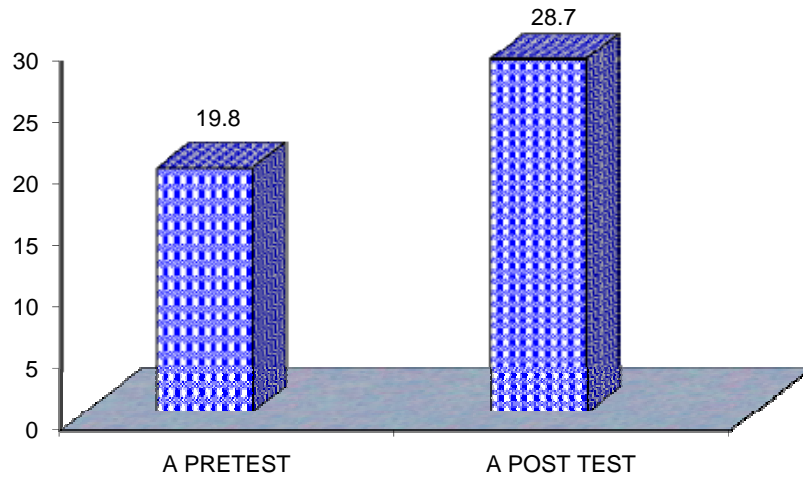
Table - 3

VALUES	GROUP A	
	CAPSULAR STRETCHING	
GROUP 'A' MEAN	A PRE TEST	A POST TEST
VALUE	19.80	28.70
Standard Deviation	3.08	1.83
Paired 't' test value	11.61	
'p' value & Significance	P Value < 0.05 significance	

Table- 3 shows the comparative mean value, mean difference, standard deviation and Paired 't'-value between Pre versus post-test of group A

It explains,

The paired 't' value of 11.61 is greater than the tabulated 't' value 2.78, which showed that there is statistical significant difference at 0.05 levels between pre versus post-test results. The pre-test mean is 19.80 and the post test mean is 28.70 and their mean difference is 8.90, which is shown in the score of increase in UCLA Score in response to Capsular stretching for Frozen shoulder patients after 4 weeks of treatment.



Graph-1 represents the mean value of pre and post test values of group

A

**DATA ANALYSIS OF PRE AND POST TEST VALUES OF
GROUP B**

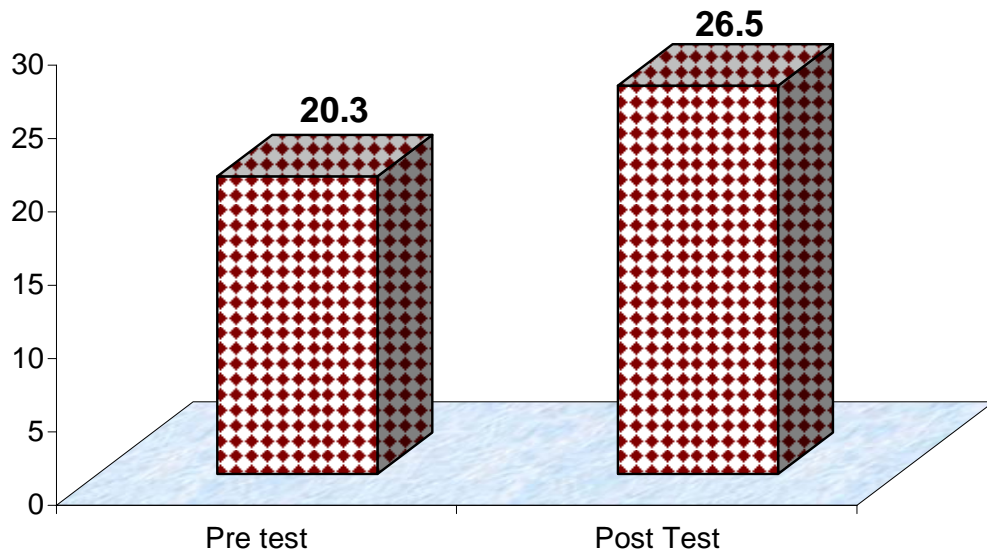
Table - 4

VALUES	GROUP B	
	MET	
GROUP 'B' MEAN	PRETEST	POST TEST
VALUE	20.30	26.50
Standard Deviation	2.67	2.32
Paired 't' test value	12.66	
'p' value & Significance	P Value < 0.05 significance	

Table- 4 shows the comparative mean value, mean difference, standard deviation and Paired 't'-value between Pre versus post-test of group B

It explains,

The paired 't' value of 12.66 is greater than the tabulated 't' value 2.78, which showed that there is statistical significant difference at 0.05 levels between pre versus post-test results. The pre-test mean is 20.30 and the post test mean is 26.50 and their mean difference is 6.20, which is shown in the score of increase in UCLA Score assessment in response to MET for frozen shoulder patients after 4 weeks of treatment.



**Graph-2 represents the mean value of pre and post test values
of group B**

**DATA ANALYSIS OF POST TEST VALUES OF GROUP A AND
GROUP B**

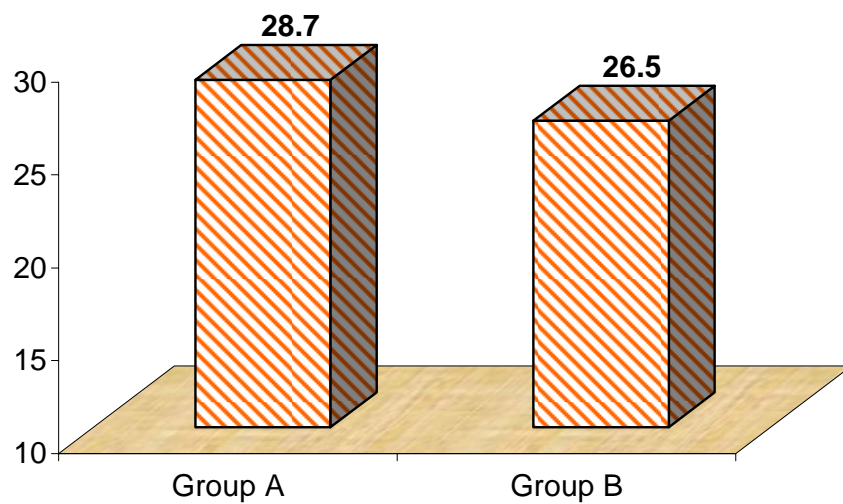
Table - 5

VALUES	CAPSULAR STRETCHING VS MET	
	Group A	Group B
Post test mean Values	28.70	26.50
Standard Deviation	1.83	2.32
Independent 't' test value	2.35	
'p' value & Significance	P Value < 0.05 significance	

Table- 5 shows the comparative mean value, mean difference, standard deviation and Unpaired 't'-value between Group A and Group B.

It explains,

The unpaired 't' value of 2.35 is greater than the tabulated 't' value 2.31 which showed that there is statistical significant difference at 0.05 levels between mean of Group A 8.90. The pre-test versus post-test mean of Group B is 6.20 and their mean difference is 2.70, which has shown in the UCLA score in response to treatment of **Group –A** when compared to **Group -B**. Therefore the study rejects the null hypothesis and **accepting the alternate hypothesis.**



Graph-3 represents the mean value of post test value of group A and B

6. DISCUSSION

The purpose of the study is to compare the effectiveness of capsular stretching versus MET in the treatment of frozen shoulder.

Bridgeman et al (1972) discover that frozen shoulder is characterized by painful stiffness of the shoulder persists for several years. It is a common disorder estimated annual incidence of 3% to 5% in the general population.

Griggs et al (2000) conducted a randomized control study on 60 patients with frozen shoulder. The purpose of the study was to find out the effectiveness of Capsular stretching to improve the shoulder ROM and functions. Finally the result suggests that capsular stretching group showed a statistically significant improvement. The mechanism by which capsular stretching caused improvement in Shoulder ROM and function could be elongation of soft tissue.

Richard W Nutton et., al (2006) conducted a study on 49 patients who had arthroscopic sub acromial decompression for chronic rotator cuff impingement and measured the shoulder function using UCLA Shoulder rating score to find outcome results of shoulder functions.

Mitchell (1967) conducted a study and suggests that MET are soft tissue manipulative methods in which patient on request, actively uses her muscles from a controlled position with mild effort against a precise counterforce. When MET is applied to the joint the acute model is always used i.e. no stretching simply movement to the new barrier and repetition of isometric contraction of agonists and antagonist

Buchmann et., al (2004) conducted a randomized control study on upper cervical apophysial joint with mobilization and manipulation before, during and after endotracheal anaesthesia. They concluded that post isometric relaxation (MET) seems to reach mainly the muscular parts of the treated motion segment and less to the other parts such as affiliated joint capsule ligaments and fascia.

From this study it can be said that both **Capsular Stretching and MET** gives effective outcome. When compared, capsular stretching is better than MET and can be used as a method of choice for the treatment of patient with frozen shoulder.

7. SUMMARY AND CONCLUSION

SUMMARY

The aim of the Study was to compare the Effect of Conventional therapy with Capsular stretching and MET in the overall functional improvement in patients with Frozen Shoulder.

The study was conducted on 20 patients with two groups of 10 each Group A was intervened with Moist Heat, Capsular Stretching and Icing whereas Group B was intervened with moist heat, muscle energy technique and Icing. The outcome parameter UCLA Shoulder Rating Score was measured prior to the treatment and the end of treatment.

In Group A Subjects who received Capsular Stretching and its overall effectiveness and improvement was found by using UCLA Scores and the results was found by using paired 't' test value is 11.61 which showed $P=0.0001$ is highly significant . This means that Capsular Stretching is effective in overall functional improvement in Shoulder.

In Group B Subjects who received MET and its overall effectiveness and improvement was found by using UCLA Scores and the results was found by using paired 't' test value is 12.66 which showed $P = 0.0001$ is highly significant. This means that MET is effective in overall functional improvement in Shoulder.

Comparison of Group A Group B was done by using independent 't' test value is 2.35 Which showed P value 0.0301 (<0.05) which is statistically significant.

CONCLUSION

The overall changes in pain, muscle strength, ROM, function and Satisfaction of Group A and Group B was obtained and that says there is improvement in both Groups. When we compare the mean ranks we can conclude that Group A is better than Group B in overall changes or improvement in the management of patients with Frozen Shoulder.

8. LIMITATIONS

LIMITATIONS:

1. There was no control group due to ethical reasons.
2. Sample size was limited to 20.
3. There was no long-term follow-up of the patients after the study.

9. RECOMENDATIONS

RECOMMENDATIONS:

1. The same techniques applied for a longer duration say 4 weeks On effectiveness of other exercise programmes.
2. The same study can be done with a longer follow-up.
3. The further study in this regard should also incorporate manipulation and mobilization thereby enhancing the outcome.

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**CONSENT TO PARTICIPATE VOLUNTARY IN A RESEARCH
INVESTIGATION**

**DEPARTMENT OF PHYSIOTHERAPY,
Shanmuga Institute of Medical Sciences,
Salem – 7, Tamilnadu.**

Name :
Age :
Sex :
Occupation :
Address :

DECLARATION

I have fully understood the nature and purpose of the study. I accept to be a subject in this study and I declare that the above information is true to my knowledge.

Signature of the subject

Place :

Date :

11.1. ASSESSMENT

1. DEMOGRAPHIC DATA :

NAME :

AGE :

GENDER :

ADDRESS :

2. CHIEF COMPLAINTS:

3. HISTORY :

PRESENT HISTORY :

PAST HISTORY

FAMILY HISTORY

MEDICAL HISTORY:

DM/HT/CARDIAC PROBLEMS / PREVIOUS SURGERIES

PERSONAL HISTORY : SMOKING/ALCOHOL/DRUGS/FOOD

HABITS/PERSONALITY TYPE.

PSYCHOLOGICAL STATUS: DEPRESSED/CONFIDENT

SOCIO – ECONOMIC STATUS :

4. GENERAL EXAMINATION :

VITAL SIGNS :

1. TEMP :

2. PULSE :

3. B.P :

4. R.R. :

5. ON OBSERVATION:

BUILT POOR/MODERATE/WELL :

POSTURAL ATTITUDE :

OBVIOUS MUSCLE WASTING :

TROPICAL CHANGES :

REDNESS :

CYANOSIS :

PIGMENTATION :

LOSS OF HAIR :

SCARS :

SWELLING :

DEFORMITIES :

EXTERNAL APPLIANCES :

6. ON PALPATION :

TENDERNESS :

WARMTH :

SPASM :

SCAR :

CREPITUS AND BONY SPUR :

7. ON EXAMINATION :

SENSORY EXAMINATION :

TOUCH :

TEMPERATURE :

PAIN :

8. MOTOR EXAMINATION :

MUSCLE TONE :

MMT/BREAK TEST :

RESISTED FLEXION :

RESISTED EXTENSION :

RESISTED ABDUCTION :

RESISTED INTERNAL ROTATION :

RESISTED EXTERNAL ROTATION :

RANGE OF MOTION :

ACTIVE : RIGHT LEFT

FLEXION	:		
EXTENSION	:		
ABDUCTION	:		
INTERNAL ROTATION	:		
EXTERNAL ROTATION	:		
PASSIVE	:	RIGHT	LEFT
FLEXION	:		
EXTENSION	:		
ABDUCTION	:		
INTERNAL ROTATION	:		
EXTERNAL ROTATION	:		
END – FEEL	:		
POSTERIOR GLIDE	:		
INFERIOR GUIDE	:		

9. SPECIAL TESTS :

APLEY’S SCRATCH TEST	:
LOAD AND SHIFT TEST	
(STABILITY TESTING)	:
IMPINGEMENT TESTS	:
SUPRASPINATUS TEST	:
SPEED’S TEST	:

DROP ARM TEST :

10. DIFFERENTIAL DIAGNOSIS:

11. DIAGNOSIS:

12. PROBLEM LIST:

13. PHYSIOTHERAPY MANAGEMENT:

Aims :

Means :

14. HOME ADVICE:

DATE:

Signature of the orthopaedician

Signature of the invigilator

Signature of the chief physiotherapist

11.2.UCLA SHOULDER RATING SCALE

Clinician's name (or ref) Patient's name (or ref)

Please answer the following questions.

During the past 4 weeks.....

Section 1 – Pain

Section 2 - Function

1 Present always and unbearable;
strong medication frequently

1 Unable to use limb

2 Present always but bearable'
strong medication occasionally

2 Only light activities possible

4 None or little at rest' present
during light activities; salicylates
used frequently

4 Able to do light housework or
most activities of daily living

6 Present during heavy or particular
activities only; salicylates used
occasionally

6 Most housework, shopping, and
driving possible; able to do hair
and to dress and undress,
including fastening bra

8 Occasional and slight

8 Slight restriction only; able to
work above shoulder level

10 None

10 Normal activities

Section 3 - Active forward flexion

5	150°
4	120°-150°
3	90°-120°
2	45°-90°
1	30°-45°
0	<30°

Section 4-Strength of forward flexion (manual muscle testing)

5	Grade 5 (normal)
4	Grade 4 (good)
3	Grade 3 (fair)
2	Grade 2 (poor)
1	Grade 1 (muscle concentration)
0	Grade 0 (nothing)

Section 5 – Satisfaction of Patient

5	Satisfied and better
0	Not satisfied and worse

The UCLA Shoulder score is __

Interpreting the UCLA Shoulder rating scale

>27 Good/Excellent <27 Fair/Poor

The maximum score is 35 points. Excellent / good indicates satisfactory results, where as fair / poor indicates unsatisfactory results.