

Effectiveness of Spencer Technique and Conventional Physiotherapy (Paraffin Wax Therapy) on Subjects with Adhesive Capsulitis in Terms of Pain, Range of Motion and Functional Ability

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Abstract:

➤ *Background:*

The prevalence (27.2%) of adhesive capsulitis is a burden to the society; hence there is always a necessity to develop effective treatment intervention for adhesive capsulitis. Even though Literatures supporting the effectiveness of Spencer technique for subjects with adhesive capsulitis are available, but no reviews are found combining Spencer technique with conventional physiotherapy for the subjects with Adhesive capsulitis. Hence there is a need to conduct a study to find out the effectiveness of Spencer technique combined with Wax therapy on range of motion, pain and functional ability among subjects with adhesive capsulitis.

➤ *Methodology:*

The study was pre-test post-test experimental study. 30 subjects belonging to the age group of 40 – 65 years, clinically diagnosed to have Adhesive capsulitis were included in this study. The Experimental group had undergone Spencer technique and Conventional physiotherapy (Wax therapy) whereas the control group had undergone Conventional physiotherapy alone for the period of 4 weeks. Outcome measure instrument: range of motion of both the groups were measured by using Goniometer, pain and functional ability were measured by using ASES scale respectively.

➤ *Results:*

Group A subjects who underwent showed more significant difference in range of motion, pain and functional ability following Spencer technique and Conventional physiotherapy (paraffin wax therapy) as compared to Group B who received only conventional physiotherapy.

➤ *Conclusion:*

Spencer technique combined with paraffin wax therapy are effective in treating adhesive capsulitis.

Keywords: Adhesive Capsulitis, Spencer Technique, Wax Therapy, Pain, Range of Motion, ASES, Goniometer.

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I. INTRODUCTION

Adhesive capsulitis or Frozen shoulder is a common ailment, characterized by a pathologic process in which the glenohumeral capsule contracts. Clinically, it manifests as shoulder discomfort, stiffness, and dysfunction. The majority of subjects experience varying presentations, ranging from severe pain and irritation to a predominance of shoulder stiffness, as they proceed through the freezing, frozen, and thawing phases of the disease (Kelley 2013).

One of the most predisposing risk factors for adhesive capsulitis is diabetes mellitus. Thirty percent of individuals with adhesive capsule disease also have diabetes mellitus, and the prevalence of adhesive capsule disease in subjects with diabetes mellitus is 13.4%, five times greater than in the general population. Thyroid and rheumatological disorders, hypoadrenalism, Parkinson's disease, heart disease, cerebrovascular disease, and, in the case of secondary adhesive capsulitis, prior trauma or surgery are additional comorbidities. Additionally, Dupuytren's contracture and trigger finger are linked, and there is some evidence linking both to dyslipidaemia problems. Interestingly, although up to 30% of cases include the dominant shoulder, adhesive capsulitis typically affects the nondominant extremity (Brandon 2018).

Several studies have confirmed higher prevalence (27.2%) and incidence (10.9%) of hypothyroidism in subjects with adhesive capsulitis. Another recent study suggested 2.69 times higher risk of developing adhesive capsulitis in subject with thyrothy. Women are more likely than males to suffer from adhesive capsulitis, which is estimated to affect 2–5% of the general population. The majority of those impacted are middle-aged, usually in their fifth to seventh decades of life (Vivek 2021).

The main symptom of adhesive capsulitis is shoulder pain that is accompanied by a significant reduction in range of motion. Pain and stiffness may be triggered by reaching overhead or while trying to take the hand behind the back. The primary clinical finding for adhesive capsulitis is reduced range of motion with forward flexion, abduction, and external and internal rotation. The natural arm swing that comes with walking may be lost in subjects with severe illness, according to observations of their stride. Muscular atrophy may be discovered upon closer inspection of the afflicted shoulder. Although specific soreness is rare and indicates a different diagnosis, palpation may reveal vague tenderness over the anterior and posterior shoulder (Maria 2012).

Spencer technique is one among the unique techniques of muscle energy technique. It is a set of standardised shoulder treatments that can be used widely for prognosis, diagnosis, and treatment. In 1916, Spencer, developed it. The seven-step Spencer technique is an articulatory method used to treat adhesive capsulitis-related shoulder limitation. This method aims to stretch tight muscles, ligaments, and capsules by passive, rhythmic motion. The final range of motion is when the majority of the force is exerted. This method improves lymphatic flow, stimulates greater joint circulation,

and stretches the tissues to increase pain-free range of motion (Jivani 2021).

Paraffin wax therapy is an effective superficial heat modality commonly used for adhesive capsulitis. Paraffin wax is utilised to promote relaxation and enhance the blood supply. An accumulation of a toxic metabolite, muscle spasm, inflammation, and psychological variables are some of the common multifactorial causes of pain. Wax treatment typically aids with relaxation and calming, which helps to improve the emotional reaction to pain and lessen muscle spasms (Khanam 2022).

The shoulder's shortest self-assessment, the American Shoulder and Elbow Surgeons (ASES) questionnaire, is highly valid and well-characterized by the scientific community. A sophisticated tool for both the subject and the examiner, the ASES provides a comparatively high number of items, many of which are excessively lengthy. Three sections make up the pASES form: ADL (10 things for each side), instability (2 items), and pain (6 items). The visual analogue scale pain score (50%) and the cumulative activities of daily life score (50%) can be combined to get a ASES shoulder score (Felix 2011).

➤ *Statement of the Study*

A study to find out the effectiveness of Spencer technique and conventional physiotherapy on range of motion, pain and functional ability among subjects with adhesive capsulitis.

➤ *Hypotheses*

- It is hypothesized that there is no significant difference in range of motion, pain and functional ability following Spencer technique among subjects with Adhesive capsulitis.
- It is hypothesized that there is no significant difference in range of motion, pain and functional ability following Conventional physiotherapy among subjects with Adhesive capsulitis.
- It is hypothesized that there may be significant difference in range of motion, pain and functional ability between Spencer technique combined with conventional physiotherapy and conventional physiotherapy alone among subjects with Adhesive capsulitis.

II. METHODOLOGY

➤ *Study Setting and Design*

The study was conducted in Physiotherapy Outpatient Department of R.V.S College of Physiotherapy, Sullur, Coimbatore. The Study design was pre-test and post-test experimental study.

➤ *Sampling Design*

Purposive sampling technique was used for this study.

➤ *Study Duration*

The study duration was 6 months.

➤ *Inclusion Criteria*

- Subjects clinically diagnosed to have Adhesive capsulitis
- Subjects within age group 40-65 years
- Both female and male subjects
- Subjects with unilateral Adhesive Capsulitis

➤ *Exclusion Criteria*

- Recent surgery
- Recent fracture or recurrent dislocation
- Any malignancies
- Acute inflammation
- Open wounds
- Rheumatoid arthritis, rotator cuff injuries, etc
- Non-cooperative subjects
- Subjects with osteopenia or osteoporosis

➤ *Measurement Tool*

Table 1 Measurement Tool

Variables	Tools
Range of Motion (ROM)	Universal Goniometer
Pain	ASES Questionnaire
Functional Ability	

➤ *Treatment Procedure:*

Once the ethical committee clearance was obtained, 30 clinically diagnosed subjects with adhesive capsulitis were selected based on the inclusion and criteria, the purpose of this study was explained to the subjects and their consent was obtained. They are purposefully divided into two groups Experimental group A received Spencer technique and Conventional physiotherapy (Paraffin wax therapy) whereas the Control group B received Conventional physiotherapy (Paraffin wax therapy) only. Both the groups were treated 5 times a week for 4 weeks and were told to continue the exercises at home. Treatment time per session: 30-40 minutes.

• *Spencer Technique (7 Steps):*

- ✓ Position of the subject: side lying on unaffected side
- ✓ Therapist position: walk standing position

✓ *Step 1: Shoulder Extension with Elbow Flexion:*▪ *Therapist Hand Placement:*

One hand stabilized the shoulder girdle (scapula and clavicle) while the other hand grasped the subject's elbow.

▪ *Procedure:*

The practitioner's cephalad hand cupped the shoulder of the side-lying subject, firmly compressing the scapula and clavicle to the thorax, while the subject's flexed elbow was held in the practitioner's caudal hand, as the arm was taken into extension towards the optimal 90° of extension. The first indication of resistance to movement was sensed, indicating the beginning of the end of range of that movement. At that 'first sign of resistance' barrier the subject was instructed to push the elbow towards the feet, or anteriorly, or to push

further towards the direction of extension - utilising no more than 20% of available strength, building up force slowly. This effort was firmly resisted by the practitioner, and after 7-10 seconds the subject was instructed to slowly cease the effort. After complete relaxation, and on an exhalation, the practitioner moved the shoulder further into extension, to the next restriction barrier, and the procedure was repeated, possibly using a different direction of effort.

✓ *Step 2: Shoulder Flexion with Elbow Extension:*▪ *Therapist Hand Placement:*

Similar to the first step, one hand stabilized the shoulder girdle, and the other hand supported the elbow and forearm.

▪ *Procedure:*

The subject had the same starting position as in the above step 1. The practitioner stood at chest level, half facing cephalad. The practitioner's non-tableside hand grasped the subject's forearm while the table-side hand held the clavicle and scapula firmly to the chest wall. The practitioner slowly introduced shoulder flexion in the horizontal plane, as range of motion to 180° was assessed, by which time the elbow would be extended. At the position of very first indication of restriction in movement (palpated by the hand stabilising the shoulder, and by the hand/arm moving the subject's arm towards the direction being assessed), the subject was instructed to pull the elbow towards the feet, or to direct it posteriorly, or to push further towards the direction of flexion - utilising no more than 20% of available strength, building up force slowly. This effort was firmly resisted, and after 7-10 seconds the subject was instructed to slowly cease the effort. After complete relaxation, and on an exhalation, the practitioner moved the shoulder further into flexion, to the next restriction barrier, where the procedure was repeated.

✓ *Step 3: Shoulder Abducted and Elbow Flexed with Circumduction:*▪ *Therapist Hand Placement:*

One hand stabilized the shoulder, and the other grasped the subject's elbow.

▪ *Procedure:*

The subject was in side-lying with flexed elbow. The practitioner's cephalad hand cupped the patient's shoulder, firmly compressing scapula and clavicle to the thorax. The practitioner's caudal hand grasped the patient's elbow and took the shoulder through a slow clockwise circumduction, while adding compression through the long axis of the humerus. This was repeated several times in order to assess range, freedom, and comfort of the circumduction motion, as the humeral head moved on the surface of the glenoid fossa. The same procedure was then performed anticlockwise. If any restriction was noted, or a simple effort towards or away from the direction of restriction may have been introduced against resistance, as described in previous Spencer positions. This would be followed by resumption of the circumduction movement until another barrier was identified.

✓ *Step 4: Shoulder Abducted and Elbow Extended with Circumduction:*

▪ *Therapist Hand Placement:*

One hand supported the shoulder, and the other hand grasped the subject's wrist or elbow.

▪ *Procedure:*

The subject was in side-lying with arm straight. The practitioner's cephalad hand cupped the subject's shoulder, compressing scapula and clavicle to the thorax, while the caudal hand grasped the subject's wrist and introduced slight traction, before taking the arm through slow clockwise circumduction. This articulates the joint while assessing range of motion in circumduction, as well as the status of the joint capsule. The same process was repeated anticlockwise.

✓ *Step 5: Shoulder Adducted and External Rotation with Elbow Flexion:*

▪ *Therapist Hand Placement:*

One hand stabilized the shoulder, and the other hand supported the elbow.

▪ *Procedure:*

The practitioner cupped the subject's shoulder and compresses the scapula and clavicle to the thorax with the cephalad hand, while cupped the elbow with the caudal hand. The subject's hand was supported on the practitioner's cephalad forearm/wrist to stabilise the arm. The elbow was taken in an arc forward of the chest so that it moved both cephalad and medially, as the shoulder adducted and externally rotated. The action was performed slowly, and any signs of resistance are noted. At the position of the very first indication of resistance to movement, the subject has instructed to pull the elbow towards the ceiling, or to push further towards the direction of adduction utilised no more than 20% of available strength, building up force slowly. This effort was firmly resisted, and after 7-10 seconds the subject was instructed to slowly cease the effort. After complete relaxation, and on an exhalation, the elbow was moved to take the shoulder further into adduction, to the next restriction barrier, where the procedure was repeated if restriction remains.

✓ *Step 6: Shoulder Abduction and Internal Rotation with Elbow Flexion:*

▪ *Therapist Hand Placement:*

One hand stabilized the shoulder, and the other hand supported the elbow.

▪ *Procedure:*

The subject's hand was supported on the practitioner's cephalad forearm/wrist to stabilise the arm. The elbow was moved towards the subject's head, to abduct the shoulder, and range of motion were assessed. A degree of internal rotation was involved in this abduction. Pain-free easy abduction should be close to 180°. Any restriction in range of motion was noted. At the position of the very first indication of

resistance to movement, the subject was instructed to pull the elbow towards the waist, or to push further towards the direction of abduction, utilising no more than 20% of available strength, building up force slowly. This effort was firmly resisted, and after 7-10 seconds the subject was instructed to slowly cease the effort simultaneously with the practitioner, using his contact on the elbow, moved the shoulder further into abduction, to the next restriction barrier, where the procedure was repeated if necessary.

✓ *Step 7: Stretching Tissue and Pumping Fluids with the Arm Extended:*

▪ *Therapist Hand Placement:*

One hand supported the shoulder, and the other hand supported the elbow or wrist.

▪ *Procedure:*

The therapist interlocked his fingertips over the deltoid muscle, the subject's hand was placed over the therapist's shoulder, and the therapist slowly moved the arm away from the shoulder and released, repeated this 5-10 times.

It was given for two sets of ten repetitions with a one-minute rest in between for five sessions per week. In the second and third weeks, the number of sets increased to three sets of ten repetitions.

• *Paraffin Wax Therapy:*

The temperature of the paraffin wax was maintained at 40-44°C. The composition of solid wax: liquid paraffin: petroleum jelly was 7:3:1. The mode of transmission of heat from paraffin to the subject skin was by means of conduction.

✓ *Preparation of Subject:*

The nature of wax treatment was explained and the area to be treated was cleaned and soaked with towel. Skin sensation was tested using test tube with hot and cold water.

✓ *Position of the Subject:*

The part to be treated comes in close proximity to the wax bath container.

✓ *Technique of Application:*

(Toweling method) a towel was immersed in molten paraffin wax and then wrapped around the body part. Several layers could be made over the body part. The subject's skin was inspected for any burn and the treatment was given for about 10-15 minutes.

III. RESULTS

Table 2 The Table Shows Mean Value, Standard Deviation and Paired 't' Value between Pre-test and Post-test Scores of Pain and Functional Ability, Shoulder Abduction, Internal Rotation and External Rotation ROM Among Group A and Group B.

Variables	Groups	Test	Mean	Standard deviation	Paired t value
Pain and functional ability	Group A	Pre-test	30.86	10.60	14.947
		Post-test	71.80		
	Group B	Pre-test	29.00	9.10	12.528
		Post-test	58.47		
Shoulder abduction ROM	Group A	Pre-test	112	11.56	8.481
		Post-test	137.3		
	Group B	Pre-test	105.3	8.42	5.824
		Post-test	118		
Shoulder internal rotation ROM	Group A	Pre-test	39.3	6.26	18.537
		Post-test	69.3		
	Group B	Pre-test	40.7	10.15	8.518
		Post-test	63		
Shoulder external rotation ROM	Group A	Pre-test	47.3	10.60	6.819
		Post-test	66		
	Group B	Pre-test	46.3	5.30	9.255
		Post-test	59		

Table 3 The Table Shows Mean Difference, Standard Deviation and Unpaired T Value between Group A and Group B Scores of Pain and Functional Ability Shoulder Abduction, Internal Rotation and External Rotation ROM.

Variables	Groups	Mean difference	Standard deviation	Unpaired 't' value
Pain and functional ability	Group A	40.94	9.89	3.18
	Group B	29.47		
Shoulder abduction ROM	Group A	52.33	10.13	3.424
	Group B	12.67		
Shoulder internal rotation ROM	Group A	30	8.44	2.49
	Group B	22.34		
Shoulder external rotation ROM	Group A	18.67	7.53	2.43
	Group B	12.67		

IV. DISCUSSIONS

The aim of the study is to find out whether the Spencer Technique and conventional physiotherapy (paraffin wax therapy) are effective on range of motion, pain and functional ability among subjects with adhesive capsulitis. The experimental group A has undergone Spencer technique and conventional physiotherapy (paraffin wax therapy). The control group B has undergone Conventional physiotherapy (paraffin wax therapy) alone for a period of 4 weeks. Before and after intervention range of motion was measured by Goniometer and pain and functional ability were measured by ASES Questionnaire.

Jivani et al., (2021) stated that the Spencer technique was an articulatory technique with seven different procedures used to treat shoulder restriction caused by adhesive capsulitis. In this technique, passive, smooth, rhythmic motion was designed to stretch contracted muscles, ligaments, and capsules. Most of the force was applied at the end range of motion. The Spencer technique could reduce pain perception by addressing restrictions and enhancing tissue mobility. It restored normal joint mechanics and improved the movement of the shoulder joint by promoting movement and circulation; the technique helped to improve lymphatic drainage in the shoulder area. Additionally, the

technique could enhance proprioception, the body's awareness of its position and movement in space.

The result of the present study stated that group A showed more significant difference in range of motion, pain and functional ability following Spencer technique and Conventional Physiotherapy (paraffin wax therapy) as compared to Group B who received only Conventional Physiotherapy (paraffin wax therapy). Hence hypothesis 1 and 2 are rejected and hypothesis 3 is accepted.

V. CONCLUSION

This study concludes that, the conventional physiotherapy was effective in improving the range of motion, pain and functional ability among subjects with adhesive capsulitis. And significantly concluded that Spencer technique combined with conventional physiotherapy was more effective in improving range of motion, pain and functional ability among subjects with adhesive capsulitis in comparison to subjects who had undergone conventional physiotherapy alone. According to these, individuals with adhesive capsulitis may benefit from better treatment outcomes if both approaches are incorporated into clinical practice.

LIMITATIONS AND SUGGESTIONS

The study was limited to assess only range of motion, pain and functional ability. The study couldn't be generalized to every one as the sample size was small. The study can be conducted using different variables and can be conducted with a wider age group. The study can be conducted with more consistent outcome measures and can be carried out for larger sample size.

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