



Research Article

COMPARATIVE EFFECT OF SLEEPER'S STRETCH AND SPENCER'S MUSCLE ENERGY TECHNIQUE ON PAIN, RANGE OF MOTION, AND FUNCTIONAL DISABILITY IN SUBJECT WITH ADHESIVE CAPSULITIS-A RANDOMIZED CONTROL TRIAL

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ABSTRACT

Background: The pathological changes in adhesive capsulitis occurs surrounding the intrinsic structure tightness. Patients with adhesive capsulitis have difficulties in everyday activities. Sleeper's stretch mainly acts on capsule. Spencer's MET is an application used to normalize the Range of motion, rather than increase flexibility. There are some studies that support Spencer's MET is more effective in patients with adhesive capsulitis and some studies which have been done proving sleeper's stretch to be beneficial in capsular tightness.

Methodology: A Randomized, controlled, single blinded study 40 subject, with adhesive capsulitis were selected based on the inclusion and exclusion criteria. Pre-assessment of pain, R.O.M, and PENN shoulder scale was taken. Further 32 subjects are randomly allocated into two groups. 16 subjects in 'GROUP A' (sleeper's stretch) were given, and 'GROUP B' (Spencer's MET) was given. Both the groups were given the conventional therapy which includes hot packs, pendular exercises, finger ladder, capsular stretch, and Maitland mobilization were given. Post assessment was done.

Conclusion: This study concludes that effect of Spencer's MET with adjuvant Conventional therapy is more effective on pain, Range of motion, and functional disability in subjects with adhesive capsulitis.

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INTRODUCTION

The shoulder joint is a ball and socket type of synovial joint. It is articulation between the head of the humerus and glenoid fossa of the scapula that is known as glenohumeral (GH) articulation and the structures contributing to the function of this joint are bones, ligaments, muscles, tendons, and bursae. Structurally, it is weak joint because the glenoid cavity is too small and shallow to hold the head of humerus.¹

In 1945 Nevaizer described adhesive capsulitis as shoulder stiffness due to inflammation, fibrosis, and capsular contracture. Adhesive capsulitis is a condition characterized by painful, progressive, and loss of active and passive GH joint range of motion in multiple planes. The pain and stiffness in the shoulder joint leads to severe disability.²

Individuals who are at higher risk of adhesive capsulitis are of age group 40-60 years that comprises of 2-5% of general population, Women's are also found to be more prevalent. 10 - 20% is Occurrence rate in diabetic population². Other comorbidities that increase risk are hypothyroidism, Parkinson's disease and idiopathic conditions, possible causes of idiopathic condition are lower bodyweight, lower body

mass index (BMI) and a positive family history of idiopathic adhesive capsulitis.

The pathological changes in adhesive capsulitis is characterized by the development of dense adhesions, capsular thickening, and capsular restrictions, especially in the dependent folds of the capsule, rather than Arthritis changes in cartilage and bones. These patients will often report an insidious onset with progressive increase in pain and gradual decrease in both active and passive range of motion. Functional impairments in this condition is night pain and disturbed sleep during acute flares that is commonly seen. Pain is during mobility and often at rest during acute flares. In mobility- there is decrease in joint play and ROM usually limiting external rotation and abduction with some limitation of internal rotation and flexion. In posture – possible faulty postural compensation with protracted and anteriorly tilted scapula, rounded shoulders. There is also decrease in arm swing during gait. In Muscle performance- general muscle weakness and poor strength in GH muscles with over use of scapular muscles leads to pain in trapezius muscle, levator scapulae, and posterior cervical muscles. There is also increased in scapulothoracic motion during arm movements to compensates for limited GH mobility.²

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Idiopathic frozen shoulder consists of four stages, that are stage1- in this stage onset of pain increases with movement and is present at night, duration of this stage is usually less than 3 months. Stage2- this stage is also known as freezing stage, it is persistent and more intense pain even in rest. The range of motion is limited in all the direction. The duration of this stage is between 3 and 9 months after onset. Stage 3- is also known as frozen stage, pain is only with movements, this stage occurs between 9 and 15 months after onset. Stage 4- this stage is also known as thawing stage, it causes minimal pain, this stage lasts from 15 to 24 months after onset, and some patients never regain normal range of motion.¹²

There are various conventional Physiotherapy management for patient with adhesive capsulitis that includes hot moist pack, Codman’s pendular exercises, finger ladder exercises, Capsular stretch, shoulder wheel exercises, Active range of motion, Capsular stretch, Maitland mobilization.³

There are studies that have concluded that sleeper’s stretch and spencer’s MET are more effective in adhesive capsulitis. Sleeper’s stretch stretches the posterior capsule of tight shoulder in order to improve internal rotation movement of the shoulder joint. It mainly acts on capsule of the joint. This technique is called as “sleeper’s stretch”, because the position of this stretch is in side-lying. To perform the sleeper’s stretch, scapular movements is restricted and then shoulder is internally rotated to isolate the posterior soft tissue restraints. Use of sleeper stretch is common in athletes, But there is lack of literature on effectiveness of sleeper’s stretch in case with Adhesive capsulitis. So some studies have reported that sleeper’s stretch is effective in Adhesive capsulitis.³

Muscle energy Techniques (MET) is a form of soft – tissue/ joint manipulations /mobilizations, deriving from osteopathic medicine employed in the treatment of 3musculoskeletal dysfunction. MET is used in the treatment of musculoskeletal pain and dysfunction, redundant manual modalities.⁴

Spencer’s MET is a standardized sequence of shoulder treatment. It was developed in 1916, by Spencer, D.O. This strategy is a well know manipulative osteopathic technique focus on mobilizing of the scapulothoracic and glenohumeral joints. It enables the limited joints and their function and affects other emotional, social and cognitive regions positively. Spencer’s Muscle Energy Technique is an articular technique. In this technique, smooth, passive, rhythmic motion is designed for stretching of contracted muscles, capsules, and ligaments. Most of the force is applied the movement end range. This technique improves pain-free movements by stretching the soft tissues, improving lymphatic flow and stimulating joint circulation.⁴

MATERIALS AND METHODS

The study design was an experimental study, carried out at a tertiary care hospital in Miraj, Maharashtra, India, in 2021-22. A sample size of 40 subjects, but 32 subjects fulfilling the inclusion criteria were recruited using a randomized purposive sampling method.

Participants

The study was performed with the approval of the ethical committee of the College of Physiotherapy, Wanless Hospital, Miraj. Participants were briefed about the nature of the study and intervention. Their informed written consent was taken.

Inclusion criteria

- Participants willing to participate.
- Both males and females.
- Age between 45-60 years.³
- Average pain level of >5 out of 10 on Numerical pain Rating Scale.
- Uncontrolled diabetes mellitus.

Exclusion criteria

- History of shoulder fractures like proximal humerus, clavicle, and scapula.
- History of traumatic shoulder dislocation.
- History of shoulder instability, subluxation, and dislocation.
- History of shoulder arthritis, like osteoarthritis, rheumatoid arthritis.
- History of post immobilization arthritis (stiff shoulder)
- History of acute impingement syndrome (tendinitis)

Intervention

- The subjects were screened and enrolled for this study based on inclusion and exclusion criteria. A brief introduction to the treatment procedure was explained to all the subjects. Demographic data were obtained from all the participants. Subjects were randomly assigned into two groups.
- Group A received- Conventional therapy and Sleeper’s stretch while Group B received Conventional therapy and Spencer’s Muscle energy technique. Range of motion, NPRS, and Penn shoulder Scale were recorded on day 1, which was followed by interventions, and on day 10 for both the groups respectively.

GROUP A	GROUP B
1. Hot moist pack 2. Exercises – <ul style="list-style-type: none"> • Codman’s pendular exercises • Finger ladder exercises • Capsular stretch • Shoulder wheel exercises • Maitland mobilization 3. Sleeper’s stretch	1. Hot moist pack 2. Exercises – <ul style="list-style-type: none"> • Codman’s pendular exercises • Finger ladder exercises • Capsular stretch • Shoulder wheel exercises • Maitland mobilization 3. Spencer’s MET

GROUP ‘A’ (Sleeper’s Stretch)

Stretch to increase internal rotation:

- Patient position made to side lying.
- On the affected side, the humerus was elevated to 90 degrees by supporting the surface.
- Then, the subject himself had to rotate the humerus internally by using the other hand for 5 repetitions.
- Each repetition is for 30 seconds.⁸

GROUP ‘B’ (Spencer’s MET)

Spencer’s met For Internal Rotation Restriction

- The goal is to promote internal rotation, which will very definitely involve shortening of the supraspinatus and infraspinatus.
- The subject should be in side-lying.

- The subject's flexed arm is placed behind his back, the dorsum of the hand should be placed against the ipsilateral lumbar area's dorsal surface without pain.
- Throughout the process, this arm positioning is maintained.
- The therapist stands facing the subject and cups the subject's shoulder with his cephalad hand, compressing the scapula and clavicle to the thorax while cupping the flexed elbow with his caudad hand. Then the resistance is applied to the movement.
- Subject is instructed to pull his elbow away from the therapist, either posteriorly or medially, or both simultaneously no more than 20% of strength to be applied.
- The effort is firmly resisted, and after 5-7 sec the subject is instructed to slowly cease the effort simultaneously with the therapist.⁴

Outcome measures

NPRS

Range of Motion:(Flexion, Extension, Abduction, Adduction, Internal Rotation, External Rotation) was taken.

Penn Shoulder Scale

The outcome measure was recorded on day 1 pre interventions, and on day 10 post-intervention.

Statistical analysis

For analysis of the collected data, SPSS version 23 was used Chi-square test was used for finding the normality of the categorical data. T-paired test and unpaired t-test was used to assess within and between-group pre and post-intervention changes. The regression model of analysis was also used in order to obtain a normal contingency of the data

RESULTS

For this study, 40 subjects with adhesive capsulitis were selected in which 32 subjects fulfilling the inclusion criteria were divided through randomized purposive sampling into two groups. Group A-Conventional therapy and Sleeper's Stretch and Group B-Conventional therapy and Spencer's MET. Outcome measures were recorded as NPRS, Range of motion, and penn shoulder scale on day-1 pre-intervention and day 10 post-intervention.

According to the findings, there is a statistically significant difference between pre and post-treatment values in Group B (Spencer's MET) with a p-value less than 5% significance threshold (i.e. 0.0010.05), which justifies the improvements in health outcome post-intervention.

This explains that Group B that is Spencer's MET is more reliable in terms of rehabilitation.

Table 1 Pre-Postanalysis With in group For sleeper stretch

Outcome	PRE mean	Post mean	P-correlation
NPRS	6.5	3.0625	0.616
Flexion	109.8125	157.8125	0.843
Extension	32.9375	42	0.618
Abduction	95.9375	149.625	0.814
Adduction	95.9375	149.625	0.814
Inte.Rotation	47.8125	64.8125	0.682
Ext.Rotation	40.687	69.4375	0.533
Penn Shoulder Score	46.25	67.9375	0.921

Data 1

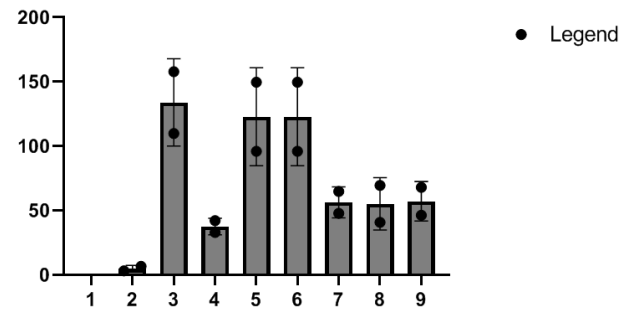


Fig No 1 Pre-Postanalysis Within group Forsleeperstretch

Table 2 Pre-Postanalysis Within group Forspencermet

Outcome	PRE mean	Post mean	P-correlation
NPRS	6.625	3.875	0.891
FLEXION	101.875	150.3125	0.843
EXTENSION	38.125	44.25	0.969
ABDUCTION	86.375	136.8125	0.971
ADDUCTION	86.375	136.8125	0.971
INTE.ROTATION	43.6875	60.875	0.919
EXT.ROTATION	37.1875	62.625	0.885
PENN SHOULDERSCORE	53.0625	66.375	0.968

Data 5

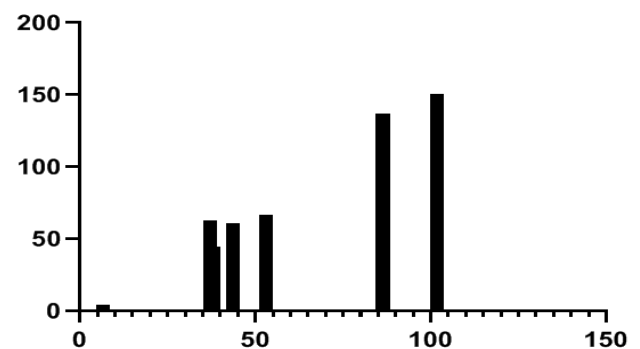


Fig No 2 Pre-Postanalysis Within group Forspencermet

Table 3 Correlation of Sleeper stretch with NPRS, Range of Motion And Penn Shoulder score

Outcome	Coefficient	tStat	P-value
NPRS	3.630631	3.628465	0.002***
FLEXION	-72.1094	-2.32365	0.035**
EXTENSION	-68.284	-2.02472	0.063
ABDUCTION	-52.481	-1.85567	0.084
ADDUCTION	-52.481	-1.85567	0.084
INTE.ROTATION	-2.81408	-0.193	0.849
EXT.ROTATION	9.114828	0.674579	0.510
PENN SHOULDERSCORE	-12.0324	-1.82034	0.090*

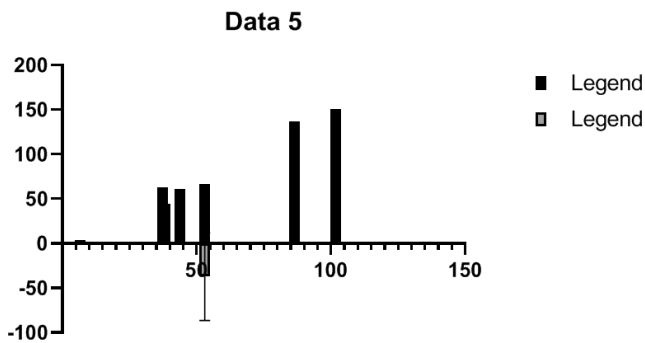


Fig No 3 Correlation of Sleeper stretch with NPRS, RANGE OF MOTION and PENN Shoulder score

Table 4 Correlation of Spencer MET with NPRS, Rangeofmotion and Pennshoulder score

Outcome	Coefficient	tStat	P-value
NPRS	2	2.042	0.060*
FLEXION	-54.086	-2.537	0.023*
EXTENSION	-11.0252	-3.287	0.005***
ABDUCTION	-38.8511	-4.759	0.0003***
ADDUCTION	-38.8511	-4.759	0.0003***
INTE.ROTATION	-18.1516	-2.545	0.023**
EXT.ROTATION	-10.6249	-1.570	0.138
PENN SHOULDERSCORE	-19.7642	-3.918	0.001***

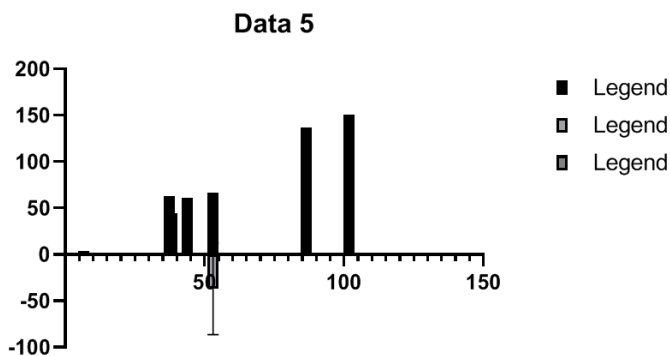


Fig No 4 Correlation of Spencer MET with NPRS, Rangeofmotion and Pennshoulderscore

DISCUSSION

This study aims to evaluate and compare the effectiveness of Sleeper’s stretch and Spencer’s MET on pain, range of motion, and functional disability in subjects with adhesive capsulitis. A total of 40 subjects were screened for adhesive capsulitis out of which 32 subjects were recruited in the study based upon inclusion and exclusion criteria. Further, these 32 subjects were randomly allocated to group A (Sleeper’s stretch) and B (Spencer’s MET) each group was having 16 subjects. Both groups were treated additionally with conventional therapy for 10 sessions over a period of 2 weeks.

Group A (Sleeper’s stretch) Subjects were treated with Hot pack for (10mins) which is useful for reducing the pain and increasing the range of motion, Shoulder wheel exercises were given, Codman’s pendular exercises were given, Capsular stretch was given, finger ladder exercise was given, and Maitland mobilization (Grade 1), and Sleeper’s stretch was given for (5 repetitions for 30-sec hold). Whereas Group B was given conventional therapy with Spencer’s MET was given (3 sets of 5 repetitions).

Both the groups showed clinically significant effect on pain, range of motion, and functional disability, but statistically Group B (Spencer’s MET) was more significant. The current study’s findings are consistent with those of ViswasRajadurai

(2011), implying that MET is beneficial in lowering discomfort and enhancing Maximal Mouth Opening in individuals with Temporo Mandibular Dysfunction.

The result showed greater improvement in Group B (Spencer’s MET).Both groups had received conventional therapy as Hot moist pack which works by improving circulation and blood flow to a particular area due to increased temperature. When heat is applied to the affected area of the body, blood vessels widen and blood flow increases to that particular area, lactic acid passes away from muscles, Heat causes vasodilation and leads to healing process and alleviates some pain.

Codman’s pendular exercises is a technique that causes the effects of gravity to distract the humerus from the glenoid fossa which causes relief of pain through gentle traction and oscillating movements provides early motion of joint structures and synovial fluid helping improvement in ranges.

Spencer’s MET works by improving the range of motion by the muscle contraction against equal counterforce that triggers the Golgi tendon organ. From the dorsal root of the spinal cord, the afferent nerve impulse from the Golgi tendon organ enters and meets with an inhibitory motor neuron. This ceases the discharge of the efferent motor neuron impulses and prevents further contraction, the muscle tone decreases which in turn is an agonist relaxing and lengthening, so there is an increase in the range of motion.

Maitland mobilization induces pain relief and increases the range of motion by its characteristic amplitude oscillatory and distraction movements which stimulate the mechanoreceptors and the proprioceptors as a result of manipulations, the oscillation may have an inhibitory effect on the perception of painful stimuli by repeatedly stimulating mechanoreceptors with the myelinated alpha-beta, fibers at the spinal cord or brain stem level. These non-stretch motion leads to a decrease in pain and an increase in range of motion.

CONCLUSION

This study concludes that the effect of Spencer’s MET with Conventional therapy is more effective on pain, Range of motion, and functional disability in subjects with adhesive capsulitis.

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Conflict of Interest: The authors have no conflict of interest relevant to this article.

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