

Original Research Article

## Comparison of Conventional Therapy versus Sleeper Stretch with Conventional Therapy in Adhesive Capsulitis

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### ABSTRACT

**Objective:** To find out the effect of Sleeper stretch in improving shoulder range of motion and functions in adhesive capsulitis.

**Study design:** Pretest-posttest experimental group design.

**Methods:** Thirty subjects with primary adhesive capsulitis with the age group of 40 - 65 years participated in the study. Patients in Group 1 (n=15) received conventional physiotherapy treatment where as patients in Group 2 (n=15) received 'Sleeper stretch' in addition to conventional physiotherapy treatment for 5 days a week for 2 weeks. Shoulder range of motion and function (SPADI) were used as outcome measure for this study.

**Results:** On comparing the shoulder range of motion, significant improvement of range was noted in Group 2 as compare to Group 1 ( $p < 0.05$ ). However, the improvement of pain and functional score of SPADI was found to be statistically insignificant between two groups ( $p > 0.05$ ).

**Conclusion:** Sleeper stretch with conventional therapy has shown to be effective for improving shoulder ranges. However, Sleeper stretch with conventional therapy showed similar effects on pain and functional activities as compared to conventional therapy alone in subjects with adhesive capsulitis.

**Key words:** Adhesive capsulitis, Sleeper stretch, SPADI.

### INTRODUCTION

Adhesive Capsulitis is a commonest musculoskeletal problem affecting middle age person characterized by shoulder pain that is aggravated by movements and limitation of range of shoulder motion and daily activities. [1]

Adhesive capsulitis has an incidence of 3–5% in the general population and up to 20% in those with diabetes. [2]

Idiopathic adhesive capsulitis is an enigmatic shoulder disorder that causes pain and reduced range of motion from joint capsule fibrosis. In most cases, the fibrosis resolves and shoulder function

returns to normal or near normal. Conservative therapies include rest, analgesia, and range-of-motion exercises. Other treatments include corticosteroid injections, capsular distention, manipulation under anesthesia, and surgical capsular release. [3]

Many modalities are suggested for relief of acute pain and muscle guarding, including Transcutaneous Electrical Nerve Stimulator (TENS), cryotherapy, phonophoresis and iontophoresis. Active assisted, active and passive exercises also play an important role in early rehabilitation of these patients. Increasing

local blood flow by exercising the shoulder to the patient's tolerance may decrease local edema and congestion. Pendulum exercises can be very effective active assisted home exercises for muscle relaxation. [4]

To regain normal extensibility of the shoulder capsule, passive stretching of the capsule in all planes of motion by means of end range mobilization techniques is recommended, but data to use these techniques are lacking. [5]

Recently, clinicians and athletes have adopted a new stretch technique to isolate the soft tissue of the posterior aspect of shoulder. This technique is known as " Sleeper stretch", because it is applied in side-lying position. To perform the sleeper stretch, scapular movement is restricted, and then shoulder is internally rotated to isolate the posterior soft tissue restraints. Use of Sleeper stretch is commonplace in athletes. Various researches are done to check the effects of this stretch in athletes having overhead activities. It is found to be effective in improving posterior shoulder range and internal rotation in these athletes. [6]

Loss of internal rotation can be improved to an acceptable level over two weeks with a compliant postero-inferior capsule stretch programme using Sleeper stretch. [7] So present study is intended to find out the effect of Sleeper stretch in improving shoulder range of motion and functions in adhesive capsulitis.

## **MATERIALS AND METHODS**

**Subjects:** Thirty subjects with primary adhesive capsulitis with the age group of 40 - 65 years participated in the study after the approval of ethical committee. The inclusion criteria were; prediagnosed case of adhesive capsulitis, sub acute and chronic stage, both male and female having at least 90 degree of shoulder abduction and elbow flexion. Subjects were excluded if they had any history of uncontrolled diabetes, recent fracture of

upper limb, elbow pathology restricting range, and cervical radiculopathy.

**Study Design:** Pretest-posttest experimental group design was selected to investigate the effect of Sleeper stretch. Shoulder range of motion (ROM) and function (SPADI) were used as an outcome measure for this study. Shoulder range of motion (Flexion, Extension, Abduction, Internal rotation, External rotation, Horizontal adduction and abduction) was measured by half circle universal goniometer. It is a reliable and valid tool to assess range of motion of joints. Shoulder function was assessed using Shoulder Pain and Disability index (SPADI). It is a self-report questionnaire developed to measure the pain and disability associated with shoulder pathology. The SPADI is only one of many joint-specific self-report forms that focuses on the shoulder. [8] SPADI has been employed in several clinical trials in this population and was found to be reliable and valid tool. This study had Institutional Ethical Clearance (IEC) and all the subjects were given written consent prior to participation. Study was conducted at Padmashree Dr D Y Patil college of Physiotherapy, Pimpri, Pune.

**PROCEDURE:** An intra rater reliability( $r=0.90$ ) for shoulder ranges was established prior to the study. A pilot study was done prior to the main study. Six adhesive capsulitis patients were taken for the study. Readings of shoulder ranges (flexion, extension, abduction, internal rotation, external rotation, horizontal adduction and horizontal abduction) were noted prior to study. Patients received Conventional physiotherapy (hot packs, Codman's exercises, stretching exercises, strengthening exercises) [1,9] and Sleeper stretch. Protocol was followed for ten days and on tenth day, again the ranges (flexion, extension, abduction, internal rotation, external rotation, horizontal adduction and horizontal abduction) [10] were noted. Results showed significant improvement

in all the ranges ( $P < 0.001$ ). Based on this pilot study main study was taken up.

Patients who fulfilled the inclusion criteria were taken for the study. The purpose and procedure was explained to the subjects. Three baseline readings of all the shoulder joint range of motion using goniometer were taken and the mean was considered for statistical analysis. Pain and functional status using Shoulder Pain and Disability Index (SPADI) was taken before the treatment. Patients were randomly divided into Group 1 and Group 2 each having 15 patients.



Fig 1: Therapist performing Sleeper stretch

Patients in Group 1 received Conventional physiotherapy (Hot packs, Codman's exercises, strengthening exercises, stretching exercises.) [1,9] and patients in Group 2 received 'Sleeper stretch' in addition to Conventional physiotherapy.

Sleeper stretch was applied in the following way. Participants' shoulders and elbows were positioned into 90 degrees of flexion with the lateral border of the scapula positioned firmly against the treatment table. Next, the investigator passively internally rotated each participant's shoulder by grasping the distal forearm and moving the arm towards

the treatment table. Pressure was held constant at the end ROM for 30 seconds and then repeated twice with 30 seconds rest between stretching episodes. [11]

Treatment was given for 5 days a week to both groups for 2 weeks. Post test readings of ROM and SPADI were taken on 10<sup>th</sup> sitting.

**Statistical Analysis:** Data was analyzed using Primer of Statistics software. An independent t-test was used to compare the difference of Shoulder ROM and SPADI score between two groups. Paired t-test was used to see those differences in each group at the end of trial. A statistical significance level was set at  $p < 0.05$ .

## RESULTS

Thirty patients of adhesive capsulitis with mean (SD) age of 56.27 (5.20) participated in the study. Table 1 and 2 details the comparison of differences of shoulder range of motion and SPADI score at the end of trial between two groups. On comparing the shoulder range of motion, there was significant improvement of flexion, extension, internal rotation, external rotation and horizontal adduction in Group B as compared to Group A ( $p < 0.05$ ). However, the improvement of abduction and horizontal abduction range of motion was found to be statistically insignificant between two groups ( $p > 0.05$ ). Similarly, the improvement of pain and functional score of SPADI was found to be statistically insignificant between two groups ( $p > 0.05$ ). Intra group comparison of shoulder range of motion and SPADI score was shown to be significant in both the groups ( $p < 0.05$ ).

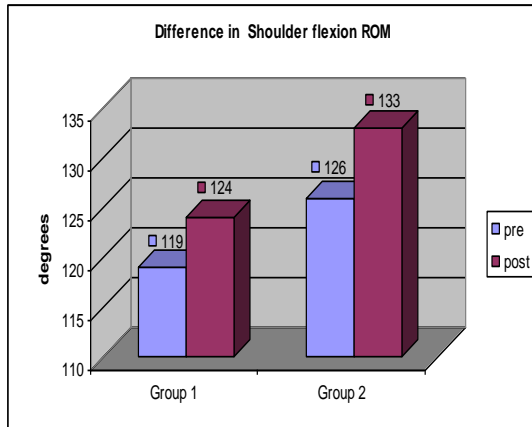
Table 1: Pre and post differences of shoulder range of motion in group1 and group 2

	Group 1 Mean (SD) N=15	Group 2 Mean (SD) N=15	t-test	
			t	P value
Flexion	5.55 (1.50)	7.73 (2.05)	3.348	0.002
Extension	2.46 (1.68)	4.60 (2.26)	2.930	0.007
Abduction	6.20 (1.89)	4.93 (2.12)	1.724	0.096
Internal rotation	9.33 (1.67)	4.40 (1.05)	9.646	0.001
External rotation	3.33 (1.11)	4.60 (1.18)	3.020	0.005
Horizontal adduction	10.20 (1.20)	4.66 (1.17)	12.721	0.001
Horizontal abduction	4.13 (2.26)	3.80 (1.42)	0.483	0.633

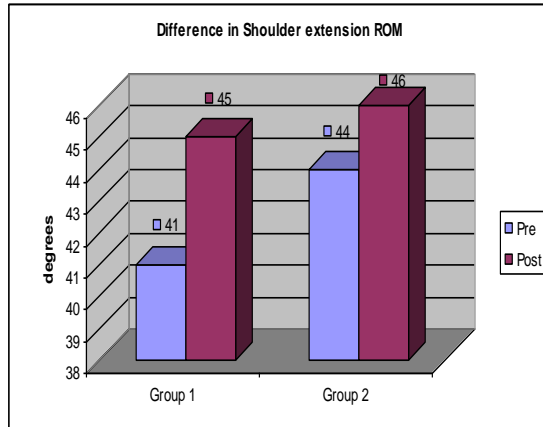
**Table 2: Comparison of differences of SPADI score between two groups**

	Group 1 Mean (SD) N=15	Group 2 Mean (SD) N=15	t-test	
			t	P value
SPADI (Pain)	2.20 (2.11)	3.33 (2.12)	1.465	0.154
SPADI (Function)	6.66 (2.66)	5.33 (1.54)	1.678	0.105

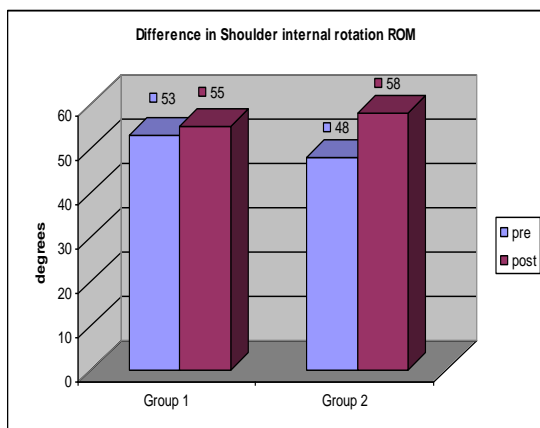
**Graph1**



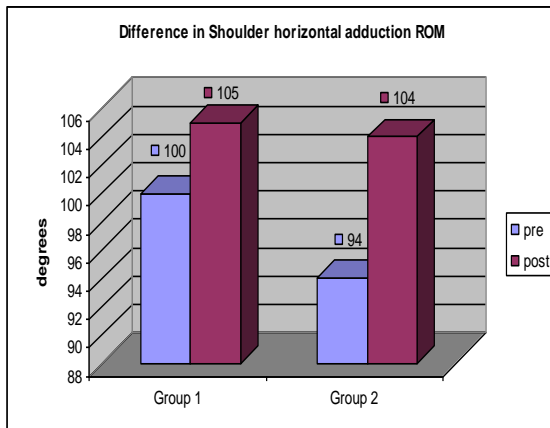
**Graph2**



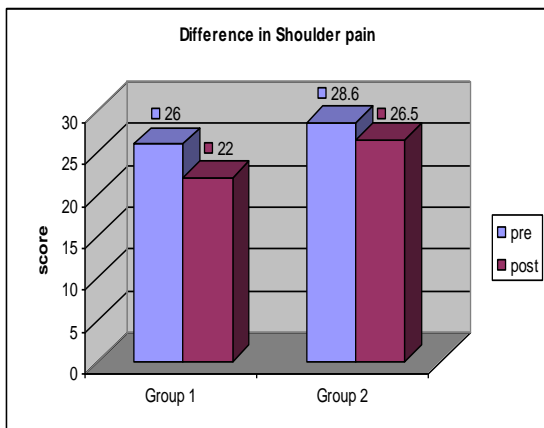
**Graph3**



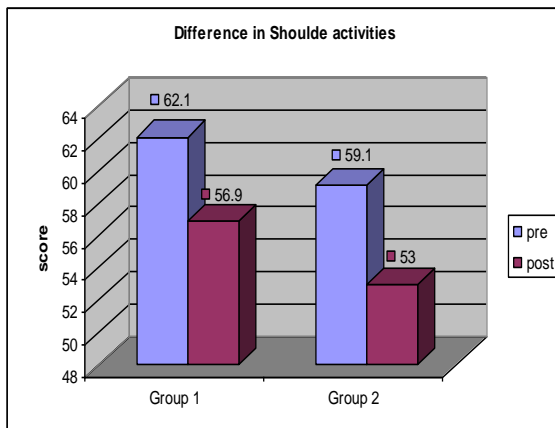
**Graph4**



**Graph5**



**Graph6**



## DISCUSSION

The aim of present study was to investigate the effect of Sleeper stretch in improving shoulder range of motion and functions in adhesive capsulitis over two

week. The results of present study revealed significant improvement of flexion, extension, internal rotation, external rotation and horizontal adduction in Group 2 as compared to Group 1 ( $p < 0.05$ ).

However, both the groups showed statistically significant improvement in all the shoulder range at the end of trial ( $p < 0.05$ ). This increase in range may be attributable to stretching of muscles and the capsule that becomes shortened because of decreased mobility and pain. Stretching gradually increase the extensibility resulting in improvement of the ranges. Strengthening with resistance exercises increase the muscle power that is decreased due to relative immobility of the movements. Hot packs application to the shoulder joint helps to improve extensibility and reduce the stiffness. The viscosity of tissues may be reduced, which partly accounts for the reduction of joint stiffness that occurs with heating (Wright V et al 1961).<sup>[12]</sup> Increased collagen extensibility occurs at higher temperatures (Lehmann et al, 1970).<sup>[13]</sup> When noncontractile connective tissues are stretched with a low intensity prolonged stretch force, plastic deformation occurs and the length of the tissue increases. Codman's exercises relieve pain through gentle traction and oscillating movements and provide early motion of joint structures and synovial fluid helping improvement in ranges (Kisner C, Colby LA, 2007).<sup>[14]</sup>

In group B Sleeper stretch was applied which helped to improve flexion, extension, internal rotation, external rotation, horizontal adduction range more as compared to conventional therapy alone due to stretching of the posterior capsule and posterior musculature thus increasing ranges of shoulder joint supported by study done by Kevin G Laudner and Robert C Sipes (2008)<sup>[11]</sup> on posterior shoulder flexibility of baseball players. Improvement in internal rotation was due to selectively stretching posterior soft tissues. This was supported by study conducted by David Lintner et. al, (2007)<sup>[15]</sup> in which they found that Internal rotation deficit caused by soft tissue adaptations can be addressed by consistent

participation in a stretching program focused on internal rotation. Improvement in external rotation might be due to increase in strength of muscles.

Decrease in pain intensity in group1 from 26 to 22 with  $p=0.000$  and 28.6 to 26.5 with  $p=0.000$  in group 2 shown in graph5 reduced due to application of hot packs which increases the local circulation and also can help to reduce spasm. As pain reduced and ranges improved, there was a significant improvement in activities. The increased blood flow that has been observed (Lehmann and de Lateur, 1982)<sup>[16]</sup> could wash out some of the pain provoking metabolites resulting from tissue injury (Wadsworth and Chanmugan, 1980)<sup>[17]</sup> these include prostaglandins and bradykinin. As the pain intensity reduced stretching tolerance also improved. This was supported by a study done by Michlovitz (1986).<sup>[18]</sup> The analgesic effect of heat allows greater tolerance of stretching: a comparison of stretching the hamstrings with prior superficial heating gave a greater increase of hip flexion than stretching alone.

There was significant difference of pre to post values of functions in SPADI in both groups. This might be attributable to reduction in pain intensity and increase in stretch ability of soft tissues.

There was no significant difference in pain and activities between group1 and group 2, as only Sleeper stretch was added in group 2. Sleeper stretch is useful in stretching the posterior tissues and is not related with pain reduction.

From the above study, it is recommended to include Sleeper stretch in regular physiotherapy treatment of Adhesive capsulitis patients to improve ranges flexion, extension, internal rotation and horizontal adduction.

Effect of sleeper stretch can be studied further in other shoulder conditions where posterior tightness is present. There is scope for further study in patients with

uncontrolled diabetes and patients having shoulder stiffness due to secondary reasons such as fractures.

## CONCLUSION

This study concludes that Sleeper stretch with Conventional therapy is highly significant in improving shoulder ranges of flexion, extension, internal rotation and horizontal adduction. Sleeper stretch with conventional therapy showed similar effects as compared to conventional therapy alone on pain and functional activities of the subjects.

## ACKNOWLEDGEMENT

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