

ORIGINAL ARTICLE

IJPHY

A COMPARISON BETWEEN CROSSBODY STRETCH VERSUS SLEEPER STRETCH IN PERIARTHRITIS OF SHOULDER

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ABSTRACT

Background: Recently Cross body stretch and Sleeper stretch are used to improve internal rotation Range of motion in Shoulder Pathologies. It was proposed to study the effect of cross body stretch and sleeper stretch in subjects with periarthritis of shoulder.

Methods: 60 subjects with a mean age of 53 years having clinical diagnosis of Periarthritis of shoulder and full filled the inclusive criteria are taken. After the initial measurements, the subjects are randomly assigned into 2 stretching groups. Group-A performed the Sleeper stretch. Group-B performed a Cross body stretch. Both Groups performed the Stretch in Duration of 6weeks – once daily for 5 repetitions holding each stretch for 30 seconds for 5 days a week. Along with this technique conventional physiotherapy like IFT, overhead pulleys, Pendula exercises, Wall climbing exercises, mariners wheel exercises are performed. After the treatment, subjects were evaluated for their pain profile using visual analogue scale, Goniometer for measuring Range of motion.

Results: For within group comparison we used Paired t-test analysis, For Between group comparison we used Independent t-test for statistical analysis. At the end of 6 weeks It was found that subjects treated with cross-body stretch showed significant improvement in terms of VAS scores and Range of motion scores (P=0.000) and patients treated with Sleeper stretch showed significant improvement in terms of VAS scores and Range of motion scores (P=0.000). When compared between Groups the VAS and Range of motion scores showed a significant improvement in Cross body stretch Group than the Sleeper stretch Group (P=0.000).

Conclusion: It was concluded that both stretching techniques were found improvement in Range of motion and VAS and Cross-body Stretch showed more Significant improvement than the sleeper Stretch after 6 weeks treatment.

Keywords: Stretch, VAS, Range of motion, cross body, GTO

Received 30th October 2015, revised 18th November 2015, accepted 22nd November 2015



www.ijphy.org

DOI: 10.15621/ijphy/2015/v2i6/80763

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INTRODUCTION

Periarthritis of shoulder typically is referred to as the spontaneous onset of gradually progressive shoulder pain and severe limitation of movement.¹ The incidence of Periarthritis of shoulder in general population is 2% and 10-20% in diabetes. It affects females slightly more than the males and is usually seen in ages 40-70 and about 12% of individuals affected develop the condition bilaterally recurrence is rare in the same shoulder.^{2,3}

Periarthritis of shoulder is also called adhesive capsulitis, frozen shoulder syndrome, pericapsulitis, scapula humeral periarthritis, shoulder portion of shoulder hand syndrome and stiff and painful shoulder. Duplay referred to Periarthritis of shoulder in 1872 as "scapulohumeral periarthritis," a disorder he believed resulted from subacromial bursitis. In 1934, Codman coined the term "frozen shoulder" as difficult to define, difficult to treat and difficult to explain. In 1945, JS Neviasser introduced the concept of adhesive capsulitis when he discovered that the capsule was tight, thickened, and stuck to the humerus in such a manner that it could be peeled off like "adhesive plaster from the skin". Features of this pathologic condition include microscopic evidence of chronic capsular inflammation with fibrosis and perivascular infiltration.⁴

Etiology of Periarthritis of shoulder remains unknown. Lundberg and Helbig et al proposed primary and secondary classifications for cases that occur spontaneously and for those that result from trauma. The primary, idiopathic cases are the most common and the least understood. An unknown stimulus produces profound histological changes in the capsule that are substantially different from changes produced by immobilization or degeneration. The secondary Periarthritis of shoulder commonly develops after a variety of antecedent episodes, such as central nervous system involvement, upper limb immobilization, trauma to the arm, pulmonary cancer or infection, myocardial infarction, lengthy duration of intravenous infusion cervical disk disease, rheumatoid arthritis, or diabetes mellitus.⁵

Periarthritis of shoulder follows a classic cycle of "freezing," "frozen," and "thawing stages". Slow, spontaneous recovery of partial or complete function occurs within 1 to 3 years. Pain associated with many other musculoskeletal disturbances, such as tendinitis and degenerative joint diseases. In the acute stage the pain is present during both activity and rest. Patients frequently complain of having pain at night and of being unable to sleep

on the affected side, resulting in long-term sleep disturbances.

As the condition progresses, during frozen stage pain during rest subsides, and discomfort occurs only during movement. Eventually, the pain decreases spontaneously, but motion restriction persists and stiffness. During Thawing stage resolution of pain and gradual recovery of joint movements.^{6,7}

Management option for this Periarthritis of shoulder is pharmacological, non pharmacological and surgical interventions and Physiotherapy.^{8,9,10}

Pharmacological management includes Analgesics, such as salicylates and codeine compounds, often are used for pain relief. Oral anti-inflammatory medications also may help to relieve pain and reduce the inflammatory reaction. Injection of a corticosteroid directly into the anatomical site of the lesion.

Surgical management includes manipulation under GA and division of subscapularis tendon and the anteroinferior joint capsule or arthrotomy of the dependent axillary folds, Arthroscopic release and open release.

Physiotherapy management includes Electrotherapy and exercise therapy. Electrotherapy is given by a way of Ultrasound Massage or Short Wave Diathermy (SWD), TENS (Transcutaneous electrical nerve stimulation), IFT (interferential therapy) and Infra Red therapy is used in reducing pain.^{12,13,14,15}

Exercise therapy includes Shoulder Mobilization Exercises, Pulley Exercises, Back Climbing Exercises, Wall Climbing Exercises, Circumduction Exercises, and Pendulum Exercises¹⁶

Recently Sleeper stretch and Cross body stretch are used to stretch the posterior shoulder tightness to improve internal rotation range of motion and they shows effective in improving internal rotation range of motion of shoulder joint in posterior capsular tightness.³⁸

Need of the study : Recent studies states that sleeper stretch and cross-body stretches are used in posterior shoulder tightness in restricted shoulder internal rotation motions in overhead athletes.¹⁷ Kevin G lauder¹⁸ used sleeper stretch in restricted shoulder internal rotation motions in overhead athletes and concluded sleeper stretching improving internal rotation range of motion and Manske RC¹⁹ used cross body stretching in restricted shoulder internal rotation motions in overhead athletes and said cross body stretch is more effective in improving Range of motion of internal rotation and Philip McClure used these 2

stretching techniques sleeper stretch and cross-body stretch in restricted shoulder internal rotation motions in overhead athletes and concluded cross body stretch is more effective than the sleeper stretch and suggested these techniques may be helpful in shoulder pathologies where internal rotation is restricted. So in periarthritis of shoulder there is a capsular tightness and restricted internal rotation range of motion.²⁰ but no study is done to compare these 2 techniques in periarthritis of shoulder subjects. So I am taking these stretching techniques and comparing along with conventional physiotherapy to find out which is more effective.

Aim of the study: To compare the effect of cross body stretch and sleeper stretch in Subjects with periarthritis of shoulder.

Objective of the study: To find the effect of cross body stretch in subjects of periarthritis of shoulder. To find the effect of sleeper stretch in subjects of periarthritis of shoulder. To know whether cross body stretch is more effective than the sleeper stretch in subjects of periarthritis of shoulder.

Operational definitions: Cross body stretch: it is a type of stretching in this the subject passively pulling the humerus across the body into horizontal adduction with the opposite arm.

Sleeper stretch: it is a type of stretching in this the subject by lying on the side to be stretched, elevating the humerus to 90° on the support surface, and then passively internally rotating the humerus with the opposite arm.

Periarthritis of shoulder: severe pain and progressive limitation of movements.¹

Goniometer: Is the instrument used to measure the Range of motion.^{21, 22, 23}

VAS: it is a subjective scale used to measure the pain. A 10 cm line marked with numbers 0 to 10 was used where 0 symbolized no pain and 10 as maximum pain. Patient was asked to mark his pain on this line as per the severity.²⁴

METHODOLOGY

It was proposed to study the effect of cross body stretch versus sleeper stretch in subjects with periarthritis of shoulder. Experimental design, Randomized control trail. Consent to carry out study was granted by institutional ethical clearance committee.

Subjects: A total number of 60 patients, both Male and Female the age range between 40-70 years of age suffering with periarthritis of shoulder and clinically diagnosed as having periarthritis of shoulder, referred to Physiotherapy department and willing to participate in the study at G.S.L

Medical college, Rajanagaram and also other community hospitals in and around Rajahmundry, were recruited for the study.

Sampling Design: It was convenient sampling method; however allocation was done randomly using the random number table.

Sample Size: Hundred (100) subjects were selected among them 70 subjects full filled the inclusive criteria and In which 6 subjects dropped from the study because of personal reasons and 4 subjects was absent continuously more than 4 stretching's and Subjects were randomly assigned to two groups Group 1 and group 2 with 30 subjects in each group.

Inclusion criteria: Subjects were selected for the study if they fulfilled the following inclusion criteria: Diagnosed by a clinician as periarthritis of shoulder, Age between 40 – 70 years of both male and female, Individuals with periarthritis of shoulder and shoulder flexed to 90 degrees, Subjects who are willing to participate in the study with symptoms of periarthritis of shoulder.

Exclusion criteria: Any patients not fulfilling the inclusive criteria are excluded, Skin lesions at the site of applications, Intra articular injections to the shoulder joint within 6 months prior to the study, Traumatic injury to the shoulder joint within 6 months of study, Existence of CNS/PNS Disorder, Mental disorders, Tumors / Malignancies.

Outcome measures: 1.Pain intensity: Measured by means of Visual Analogue Scale (VAS). A10 cm line marked with numbers 0 to 10 was used where 0 symbolized no pain and 10 as maximum pain. Patient was asked to mark his pain on this line as per the severity. 2. Range of motion: measured by means of universal Goniometer.

PROCEDURE

All the subjects with pain in the Shoulder joint, Restriction of shoulder Internal Rotation and clinically diagnosed of having Periarthritis of shoulder were screened and after finding their suitability as per the inclusion and exclusion criteria patients are requested to participate in the study. The subjects willing to participate in the study were briefed about the nature of the study and the intervention. After briefing them about the study, their informed written consent was taken.

The demographic data like age, sex, height, weight, occupation, and address was collected. Joint involved and duration of the symptoms was noted. Initial evaluation for their pain profile using visual analogue scale (VAS) was taken. Goniometer was used by measuring Range of Motion of Shoulder joint Internal Rotation by Investigators. For

recording of pain intensity by using Visual Analogue Scale (VAS), the subjects were asked to mark their intensity of pain on a 10 centimeter long line marked with numbers 0-10 where 0 indicated no pain and 10 was for maximum pain.

Measurement procedure: All measurements were performed by 1 of 2 testers who were blind to treatment group. Same tester performed both pre test and post test measurement on a given subjects.



Figure 1: Measurement of passive internal rotation with the shoulder flexed to 90° in the frontal plane.

Internal rotation measured by Side lying of shoulder. Internal rotation range of motion were obtained with the subject lying on the dominant or involved side, in a position in which the acromion processes were aligned perpendicular to the plinth by visual estimation. The shoulder was flexed to 90° with 0° rotation and the elbow was flexed to 90°, The forearm is midway between pronation/supination with the entire humerus is supported by the table. Stabilize the distal humerus through the full ROM and stabilize the thorax/scapula at the end ROM. Goniometer Axis at The olecranon process of the ulna projecting through the humeral shaft toward, the humeral head Stationary Arm Parallel to the supporting surface or perpendicular to the floor Moving Arm Parallel to the longitudinal axis of the ulna pointing toward the styloid process.^{25, 26}

INTERVENTION

Stretching intervention: After the initial measurements, the subjects are randomly assigned into 2 stretching groups.

Group A: Sleeper Stretching Intervention - Group A performed the sleeper stretch by lying on the side to be stretched, elevating the humerus 90° on to the supporting surface, then passively internally rotate the humerus with the opposite arm. Duration of 6 weeks - once daily for 5 repetitions holding each stretch for 30 seconds for 5 days a week.

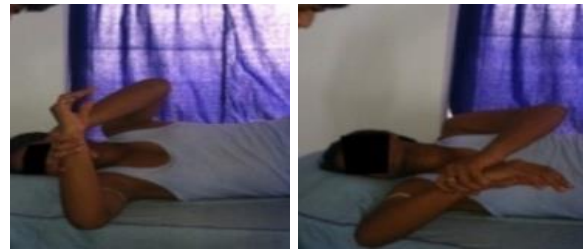


Figure 2: Patient performing the Sleeper stretching in sidelying position

Along with this technique conventional physiotherapy like IFT, overhead pulleys, Pendular exercises, Wall climbing exercises, mariners wheel exercises are performed.

Group B: Crossbody Stretching Intervention - Group B performed a cross body stretch by passively pulling the humerus across the body into horizontal adduction with the opposite arm. Duration of 6 weeks - once daily for 5 repetitions holding each stretch for 30 seconds for 5 days a week. Along with this technique conventional physiotherapy like IFT, overhead pulleys, Pendular exercises, Wall climbing exercises, mariners wheel exercises are performed.



Figure.3. Patient performing the Crossbody stretching in seated position

Both Groups-A & B performed the Stretching by the duration of 6weeks - once daily for 5 repetitions holding each stretch for 30 seconds for 5days a week. Along with these techniques conventional physiotherapy like IFT, overhead pulleys, Pendular exercises, Wall climbing exercises, mariners wheel exercises are encouraged for the duration of 30 minutes.

After the treatment, subjects were evaluated for their pain profile using visual analogue scale, Goniometer For measuring Range of motion, all measurements were taken again by the same tester and Range of motion noted After therapeutic intervention.

RESULTS

The results of this study were analyzed in terms of pain relief indicated by decrease in Shoulder pain on **VAS**, Increased shoulder internal rotation Range of motion on Universal Goniometer.

Comparison was done both within each group as well as in between the two groups. So as to evaluate

the intra group and inter group effectiveness of sleeper stretch and cross-body stretch which are under considerations in the present study.

Statistical analysis:

All the statistical analyses were performed by using SPSS software trail version 21.0 and MS excel 2007. Discreptive statistical analysis is presented in the form of mean +/- Standard deviation and percentages. T test is performed to assess the mean significance differences between various discrete variables. For all statistical analysis (p<0.05) was considered as statistically significant.

Table 1: Age Distribution

Age (Yrs)	Group A sleeper stretch(SS)	Group B Crossbody stretch (CS)
41 – 50	11	8
51- 60	15	19
61- 70	4	3

Age of the subjects in this study was between 40 to 70 years (Table -1). The average age of the subjects in group A is 53.1. The average age of the subjects in group B is 53.16.

Table 2: Sex Distribution:

Groups	Male	Female	Total
Group A SS	16	14	30
Group B CS	17	13	30

These were 30 subjects in each of group; Group A (SS) had 16 males and 14 females, Group B (CS) has 17 males and 13 females, so 33 males and 27 females were present.

Table 3: Distribution of Means of Demographic profile:

Age, height, Body weight.

Groups		Group A SS	Group B CS
Age (Yrs)	Mean	53.17	53.16
	SD	6.988	5.576
Height (Mts)	Mean	1.60	1.575
	SD	0.068	0.795
Body weight (Kgs)	Mean	63.67	63.23
	SD	9.806	7.749

Age of subjects in this study was between 40-70. The average age of subjects in group A (SS) was 53.17 and in group B (CS) was 53.16. Height of the subjects in this study was between 147 cm – 174 cm. The average height of the subjects in group A (SS) was 1.60 and in group B (CS) was 1.5757.

Body weight of the subjects in this study was between 45-80 kgs. The mean body weight of the subjects in group A (SS) was 63.67, in group B (CS) was 63.23.

Table 4: Pain Relief (Mean changes in VAS Score):

Groups		Group A SS	Group B CS
Pre Treatment	Mean	6.77	6.80
	SD	1.006	0.961
Post Treatment	Mean	3.80	2.83
	SD	0.761	0.971
P Value		0.000	0.000
Inference		significant	significant

Pain relief was recognized by reduction in VAS score. For this VAS score was noted on the first day and the last day (After 6 weeks) of the treatment for all the subjects. However the difference between the 2 scores was considered for analysis of difference between the two groups.

The average VAS score in group A (SS) on 1st day was 6.77, which were reduced to an average of 3.80 on last day (After 6 weeks) of the treatment.

There was highly significant difference between the VAS Scores in the subjects in the sleeper group i.e P < 0.017.

For within group comparison we used Paired t-test analysis.

The average VAS score in group B (CS) on 1st day was 6.80, which were reduced to an average of 2.83 on last day (After 6 weeks) of the treatment.

There was highly significant difference between the VAS Scores in the subjects in the Cross body group i.e. P < 0.000.

Table 5: Pain Relief (Mean changes in VAS Score):

Group	Sleeper stretch	Crossbody stretch
Post treatment mean	3.80	2.83
SD	.761	.971
p value	0.000	0.000
Inference	significant	Significant

There was highly significant difference between the VAS Scores in the subjects in the Sleeper group and Cross body group i.e P 0.000.

For Between group comparisons we used Independent t-test analysis.

Table 6: Mean changes in Shoulder internal rotation Range of motion –Universal Goniometer index:

Group		Group A Sleeper stretch	Group B Crossbody stretch
Pre treatment	Mean	23.10	24.03
	SD	2.524	2.205
Post treatment	Mean	44.33	49.40
	SD	2.368	2.328
p value		0.000	0.000
interference		significant	Significant

Improvement in Shoulder internal rotation Range of motion was indicated in terms of improvement in Universal Goniometer score (degrees). For that initial and final score was noted on 1st and last day (After 6 weeks) of the treatment in all the subjects. However the difference between two scores was considered for analysis of the difference between the two groups.

In the group A (SC), the average Universal Goniometer score (degrees) on 1st day was 23.10 and on last day (After 6 weeks) of the treatment were 44.33.

There was highly significant difference between the Universal Goniometer score (degrees) in the subjects in group A (p 0.000).

In the group B (CS), the average Universal Goniometer score (degrees) on 1st day was 24.03 and on last day (After 6 weeks) of the treatment were 49.40.

There was highly significant difference between the Universal goniometer score (degrees) in the subjects in group B (P 0.000).

For within group comparison we used Paired t-test analysis.

Table 7: Mean changes in Shoulder internal rotation Range of motion – Universal goniometer index:

Group	Sleeper stretch	Crossbody stretch
Post treatment	44.33	49.40
SD	2.368	2.328
p value	0.000	0.000
interference	significant	significant

There was highly significant difference between the Universal goniometer score (degrees) in the subjects in group A and B (P 0.000).

For Between group comparisons we used Independent t-test analysis.

DISCUSSION

The clinical picture in periarthritis of shoulder is characterized by pain and limitation of movements in abduction and in both internal and external rotation.³ many authors states that the loss of internal rotation is likely the result of postero-inferior capsular contracture and say that contracted postero-inferior capsule creates a postero-superior shift in the humeral head. This leads to decreased space between the humeral head and acromion.^{17, 23}

Some authors states that both posterior joint capsule and posterior rotator cuff muscles are originated such that they would limit internal

rotation to 90°. So this tightening of the capsule correlates with loss of physiological movements of the shoulder mainly abduction and rotation.⁽³⁾

In this study the effectiveness of cross body stretch and sleepers stretch on pain and internal rotation range of motion in patients with periarthritis of shoulder were compared.

Although intra group comparison in both stretch groups showed increased in pain and internal rotation Range of motion. But when compared between groups cross body stretch showed to be more effective VAS and universal goniometer are taken as outcome measures since their reliability and validity are already established.^{22, 24, 25} Improvement in both the groups with stretching procedures may be due to position of the arm elevated to 90°. Cadaveric studies have shown this position stresses the postero-inferior aspect of the gleno-humeral joint capsule.²⁷

Improvement in VAS and Range of motion in sleepers stretch when compared with in groups pre and post intervention is due to the stabilization of the scapula as performed with sleeper stretch would seem to enhance the effectiveness of stretching for the posterior shoulder region.

Improvement in VAS and Range of motion in cross body stretch when compared with in the group might be due to the non painful method and minimal discomfort produced during the stretching exercises. stretching does not elicit the muscle spindles, allowing muscles to relax and achieve a greater stretch i.e. increase in flexibility is related to increase in stretch tolerance and increased range of motion may be related to Analgesic effect that allows the person to tolerate higher levels of passive tension to stretch the muscle that it was before so greater Range of motion is with higher passive tensions.

Another related factor is that stretching decreases the passive tension in the muscle at a given length. This decrease in passive tension in the muscle at a particular joint angle is due to stress relaxation. Stress relaxation is the decrease in stress (force per unit area) in a material elongated and held at a constant length. Holding stretches for 20 to 30 seconds is a good standard because most of the stress relaxation in passive stretches occurs in the first 20 seconds; Patients can feel this decrease in muscle tension when they hold a static stretch. Stress relaxation following stretching provides an acute 10-30% decrease in passive tension.²⁸

The other important are the **Golgi tendon organs** (GTO). These are located near to the musculo tendinous junctions and are sensitive to

increase in muscle tension. When the GTO is stimulated it causes a reflexive relaxation in the muscle. When this relaxation occurs in the same muscle that is being stretched, it is referred to as **Autogenic inhibition** and can facilitate the stretch, this is due to H reflex activity, H reflex provides muscle motor neuron excitability during stretching, stretching causes excitability of motor neurons from the subliminal fringe because of alpha-gamma linkage in reciprocal inhibition.^{29,30}

But when compared between groups cross body stretch showed significant improvement although the exact mechanism is unknown, this could be due to the symptomatic patients may be limited minimally by pain rather than shortened periarticular tissues. Secondarily because of inconvenient position required in performing the sleeper stretch caused the patients to perform the stretch less intensity and for less time because of pain based on self reporting data according to Philip et al Other reasons might be pain could prevent adequate end range stretching and therefore limit the effect of the stretch on periarticular tissue and range of motion based on the physical stress theory proposed by muller and malay, increasing gains would likely require increasing levels of end range stress either by increasing intensity, frequency or duration.

Limitations of the Study:

Less Sample Size, Quantification of stretch may not be reliable, Duration of symptoms was variable, and pain relief which was observed by VAS may not be reliable as VAS is a subjective, though found to be significant, Long-term effectiveness is not evaluated.

CONCLUSION

On the basis of this study, Cross Body Stretch is more effective and used as effective conservative management for pain relief, and increasing the function than sleeper stretch and It was Statistically Proved.

Suggestions for Future Research : The future research could be by changing the parameters including increasing levels of end range stress either by increasing intensity, frequency or duration used in this study As well as patients in Different Stages or Particular Stages of periarthritis of shoulder.

ACKNOWLEDGEMENT : I take this opportunity to express my profound gratitude and deep regards to almighty God and my parents, my family members and who supported me a lot during this and I thank all my subjects for their support.

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Citation

Shaik Raheem Saheb, Patchava Apparao, CH. Ashok Chakravarthy, & CH. Ganapathi Swamy. (2015). A COMPARISON BETWEEN CROSSBODY STRETCH VERSUS SLEEPER STRETCH IN PERIARTHRITIS OF SHOULDER. *International Journal of Physiotherapy*, 2(6), 1012-1026.