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Effect of Cyriax Soft Tissue Release versus Active Release Technique in Subjects with Frozen Shoulder

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Abstract

Background and Objective: Frozen shoulder is a painful condition marked by progressive stiffness and limited shoulder function. Manual therapy techniques such as Cyriax soft tissue release and Active Release Technique (ART) are frequently used in rehabilitation to reduce pain and enhance mobility. This study aimed to compare the effectiveness of Cyriax soft tissue release and Active Release Technique in improving pain, range of motion, and functional ability in individuals with frozen shoulder.

Methods: A quasi-experimental study was conducted with 77 clinically diagnosed frozen shoulder patients, with a mean age of 52.3. Participants were divided into two groups: Group- A (n=39) received Cyriax soft tissue release and Group-B (n=38) was treated with Active Release Technique. Both interventions were administered thrice weekly for 4 weeks. The outcomes were assessed using the Visual Analogue Scale (VAS) for pain, Universal goniometer for shoulder range of motion (ROM), and SPADI for function.

Results: An independent t-test was conducted to compare the mean difference between continuous variables across the two groups, while a paired t-test was applied to evaluate the statistical significance of change between pre- and post-intervention scores within each

group. Analysis of the data indicated that both groups experienced significant improvements in all measured parameters. However, when comparing the groups, Cyriax soft tissue release demonstrated greater enhancement in outcomes compared to the Active Release Technique.

Conclusion: Cyriax soft tissue release and Active Release Technique are both beneficial in managing symptoms of frozen shoulder. Nevertheless, Cyriax soft tissue release showed comparatively better improvements, making it a potentially more effective approach in clinical practice.

Keywords: Active Release Technique, Cyriax soft tissue release, Frozen shoulder

Introduction

Frozen shoulder, arises when the connective capsule enveloping the glenohumeral joint progressively becomes stiff, thick, and adherent. As these pathological changes advance, the shoulder gradually loses its normal range of motion.[1] The condition originates within the musculoskeletal system and is generally recognized by persistent pain, progressive rigidity, and a slow decline active and passive arm movements.[2]

The American Academy of Orthopedic Surgeons (AAOS) defines frozen shoulder as a disorder in which both voluntary and assisted movements are markedly reduced, even though radiological findings are often unremarkable, aside from occasional minor reductions in bone density. The clinical syndrome was first introduced by Duplay in 1872 under the name “humeroscapular periarthritis”, and Codman later provided a more detailed description in 1934.[3]

Because of the substantial limitation of movement, frozen shoulder can disrupt normal daily activities. Symptoms usually appear gradually, beginning with pain-frequently more intense at night-followed by noticeable stiffness and difficulty performing overhead or behind-back movements. One of the most characteristic signs is a marked reduction in external rotation.[4]

The condition affects approximately 2-5% of the general population it is most frequently seen in individuals aged 40-60 years and occur slightly more often in women. In around 10-20% of cases, both shoulders may eventually be involved, usually in succession rather than the same time.[5]

A number of systemic health conditions can increase the risk of developing frozen shoulder. Among theses, diabetes mellitus shows one of the strongest associations, these correlations highlight the involvement of metabolic disturbances and inflammatory or fibrotic mechanisms in the development of adhesive capsulitis.[6]

The underlying pathology develops through a gradual shift from inflammation to fibrosis within the joint capsule. The early inflammatory changes in the synovium stimulate the release of mediators such as interleukin-1 and transforming growth factor-B, which promote fibroblast activity and vascular alterations. These changes predominantly affect the anterior capsule and the rotator interval. Persistent inflammation encourages an accumulation of myofibroblast and excessive collagen (particularly types I and III), leading to tightening and reduced elasticity of the capsule.[7]

As the condition advances, the capsule may thicken and form adhesions with the humeral head or nearby tissues. The coracohumeral ligament may shorten, and fibrotic development further restricts shoulder mobility. Additionally, reduced synovial fluid lowers joint lubrication, while increased sensitivity of peripheral

nerves-mediated by substances such as substance P and nerve growth factor-can prolong pain even after inflammation settles. Over time, some degree of tissue remodelling may occur, allowing slow recovery of movement.[8]

These anatomical and tissue changes result in mechanical restrictions within the joint. Tightening of the capsule, shortening of the coracohumeral ligament, and narrowing of the axillary recess reduce joint volume and disturb normal biomechanics.[9]

The compensatory mechanisms can overburden surrounding muscles and may contribute to ongoing discomfort and functional challenges. As a result, frozen shoulder is understood as both a biomechanical and biochemical disorder, where fibrotic inflammatory processes alter joint function and perpetuate a cycle of stiffness, restricted mobility, and pain.[10]

The natural course of the condition is typically divided into three overlapping stages. The initial "freezing" stage, which lasts roughly 2-9 months, is characterizes by increasing pain and emerging stiffness. The "frozen" stage follows, lasting approximately 4-9 months, marked by reduced pain but pronounced loss of movement. The final "thawing" phase, which may take 6- 24 months, shows gradual improvement in mobility, although some patients may retain minor long-term limitations.[11]

A variety of predisposing factors appear to increase susceptibility to frozen shoulder, emphasizing the importance of early recognition. Women tend to be slightly more affected, potentially due to hormonal influences or inherent differences in connective tissue characteristics.[12]

Diagnosis is primarily clinical, based on a detailed history and physical examination. Significant reductions in both active and passive movement-especially in external rotation and flexion-are typical findings. Standard X rays are usually normal, though slight joint space narrowing may sometimes be observed. MRI may demonstrate capsular thickening, increased density of the coracohumeral ligament, reduced axillary recess volume, and other indicators of inflammation or fibrosis.[13]

Ultrasound imaging may reveal limited capsular pliability, thickening of the coracohumeral ligament, or abnormalities in the rotator interval. Arthrography can show reduced joint capacity and restricted expansion of the axillary recess. These imaging tools may also help identify systemic conditions contributing to the disorder.[14]

Initial treatment priorities pain reduction, inflammation control, and gradual recovery of motion. Commonly used medications include Nonsteroidal anti-inflammatory medications (NSAIDS) like ibuprofen and naproxen to ease symptoms and reduce inflammation. [15]

For individuals with significant pain or restricted mobility, intra-articular corticosteroids injections- such as triamcinolone accetonide or methylprednisolone acetate-may offer short-term relief and support improvements in range of motion.[16]

If conservative care does not provide progress, surgical options may be considered. Manipulation Under Anaesthesia (MUA) involves passively mobilizing the shoulder to release adhesions, while arthroscopic capsular release surgically divides contracted areas of the capsule to restore function.[17]

Although symptoms may improve naturally over time, physiotherapy remains essential in conservative management. Early rehabilitation helps reduce pain, restore mobility, correct altered biomechanics, and limit long-term deficits.[18]

Frequently used physiotherapy modalities include Transcutaneous Electrical Nerve Stimulation (TENS), Interferential Therapy (IFT), and therapeutic ultrasound, which assist in pain reduction and enhance movement. Joint mobilization techniques-such as oscillatory and sustained glides- help stretch the contracted capsule and improve functional range.[19]

Cyriax Soft Tissue Release (CSTR) is a manual therapy approach aimed at reducing adhesions, addressing fibrotic tissue, and improving soft-tissue mobility. It uses targeted dee pressure and mobilization techniques to alleviate periarticular tightness by increasing circulation and improving tissue extensibility.[20]

Active Release Technique (ART) uses controlled manual pressure in combination with specific patient-initiated movements to address restrictions in muscles, fascia, and tendons. It targets soft tissue and capsular tightness to restore smooth, efficient movement and reduce compensatory patterns.[21]

Although each technique uses different method both CSTR and ART aim to reduce adhesions, improve tissue mobility, and enhance overall shoulder function.

Materials and Methods

This is a quasi-experimental study design approved by the Ethical Committee of GSL Medical College & General Hospital. The study was conducted for duration of one year from July 1st 2024 to June 30th 2025 at Department of Physiotherapy OPD, Tertiary Care Teaching Hospital, Rajamahendravaram.

A total of 80 subjects were screened in that 77 subjects, both men and women with frozen shoulder were included. The recruited participants were explained about the study. After obtaining informed consent, all the eligible participants were randomized into two groups with 39 subjects in GROUP A- Cyriax soft tissue release and 38 subjects in GROUP B-Active Release Technique. Subjects received 3 sessions in a week for 4 weeks. Visual Analogue Scale, Universal Goniometer, and Shoulder Pain and Disability Index was used for pain, range of motion, and function to evaluate both the groups before and after the intervention.

Inclusion Criteria: Patients with stages 1 and 2 of frozen shoulder, unilateral shoulder involved having shoulder pain more than a month, subjects with diabetes mellitus were also considered, age between 40-60 years of both male and female and subjects who are willing to participate in the study.

Exclusion Criteria: Recurrent adhesive capsulitis, surgical procedures of the shoulder joint, rotator cuff tear, other ligament injuries, shoulder related arthritis, malignancy, frozen shoulder secondary to fracture, dislocation, any neurological disorder related to shoulder and tendinitis.

Outcome Measure

VAS (Visual Analogue Scale): It is a well-established clinical instrument known for its reliability, validity, and sensitivity in quantifying pain intensity. It consists of a 10cm horizontal line with anchors representing “no pain” at one end and “worst imaginable pain” at the other. Patients are instructed to indicate their current pain level by marking a point along the line. In the present evaluation, pain severity associated with frozen shoulder was assessed using the VAS.

Universal Goniometer: The Universal Goniometer (UG) is an extensively utilized instrument for the evaluation of joint range of motion (ROM), recognized for its reliability, validity, and responsiveness. This full-circle, 360º protractor device facilitates accurate measurement of peripheral joint mobility by alignment along the joint’s axis of rotation. ROM in a single plane

can be systemically quantifies, and the instrument is composed of three principal components, each contributing to its precision and ease of use.

SPADI: The Shoulder Pain and Disability Index is a self-administered assessment tool that quantifies shoulder pain and functional impairment It comprises two subscales: a pain subscale with five items measuring the intensity of pain, and a functional subscale with eight items evaluating the degree of difficulty in performing activities of daily living requiring upper-extremity use.

Intervention

Group A: Cyriax Soft Tissue Release

Cyriax soft tissue release for Pectoralis major: Patient position: Supine, shoulder abducted to 30^{o}, elbow flexed; Therapist position: Standing at patient's side Technique: The thumb or fingertips apply deep, transverse friction across the pectoralis major (anterior axillary fold area) or along the muscle belly near the clavicle. Passively take the arm into maximum flexion (overhead) while stabilizing the scapula to prevent shrugging. Repeat this for three times for 30 seconds. Time- 6-8 minutes.

Figure 1: Soft tissue release for pectoralis major

Cyriax soft tissue release for Teres major: Patient position: Side-lying on the unaffected side, with the affected arm slightly abducted and internally rotated. Therapist position: Prone lying near the patient Technique: The thumb or fingertips apply deep, transverse friction across the belly and musculotendinous junction of the teres major, just superior to the inferior angle of scapula. Now, the therapist passively stretches the arm into maximum flexion and abduction. Repeat this for three times for 30 seconds. Time- 6-8 minutes.

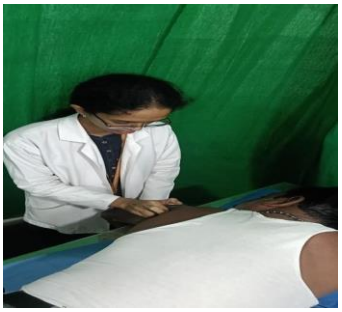


Figure 2: Cyriax soft tissue release for Teres major

Cyriax soft tissue release for teres minor: Patient position: Prone, arm hanging off the side of the table. Therapist position: Standing at the side of the table, stabilizing the scapula Technique: The thumb or fingertips apply deep, transverse friction across the teres minor near the posterior shoulder capsule. Now, passively take the arm into maximum internal rotation and hold at the end-range barrier. Repeat this for three times for 30 seconds. Time-6- 8 minutes.

Figure 3: Cyriax soft tissue release for teres minor

Group B: Active Release Technique

Active release technique for Pectoralis Major: Patient position: Supine, arm resting at the side Therapist position: Standing at the side, facing the chest Technique: The thumb or fingertips applies deep tension across the pectoralis major muscle belly or tendon. Now, actively move the arm from extension or neutral to full flexion. Repeat this for 6 to 8 times.

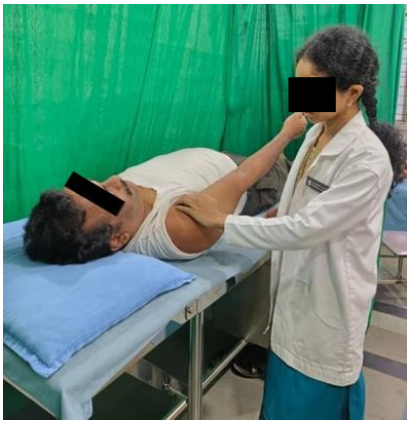


Figure 4: Active release technique for Pectoralis Major

Active release technique for teres major: Patient position: Side-lying on the unaffected side, with the affected arm resting at the side (shortened position, adduction and internal rotation.) Therapist position: standing behind the patient Technique: The thumb or finger apply deep tension across the teres major muscle fibres near the lateral scapular border. Now the patient is instructed to slowly move the arm from the resting position into full abduction and flexion. Repeat this for six to ten times.

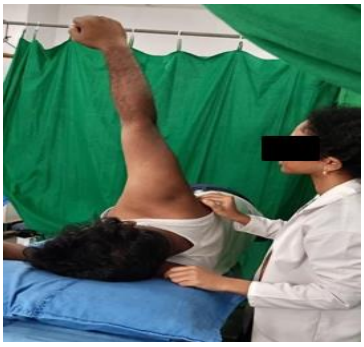


Figure 5: Active release technique for teres major

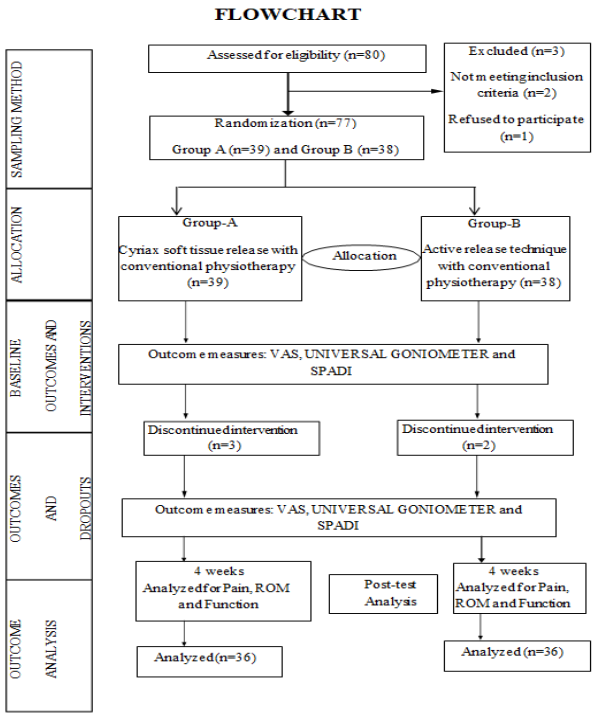
Active release technique for teres minor:

Patient position: Prone, arm abducted to 90º and maximally externally rotated Therapist position: Standing at the head of the table, facing the shoulder. Technique: The thumb or fingertips apply deep sustained tension across the teres minor (posterior belly). Actively move the arm from external rotation to full internal rotation. Repeat this for 6 to 8 times.

Figure 6: Active release technique for teres minor

Conventional Physiotherapy

Conventional Physiotherapy includes the ultrasound, pendular exercises, finger ladder exercises, wand exercises. Both the groups received conventional physiotherapy. Ultrasound was given for 8-10 minutes at a 3 MHz frequency with an intensity of 1.5W/cm^2 for a period of 5-10 minutes. Pendular exercises were instructed to the subjects and were advised to perform it for 5 to 8 minutes. Finger ladder exercises were instructed and were advised to perform for 5 to 8 minutes. Wand exercises are to be performed for 5 minutes.



Statistical Analysis

All statistical analysis was done by using SPSS software version 20.0 and Microsoft Excel- 2007. Descriptive data was presented in the form of mean +/- standard deviation and mean difference percentages were calculated and presented. Within the groups: Paired student "t" was performed to assess the statistical difference within the groups for Pain, Shoulder Range of Motion and Function from pre-test and post-test values.

Between the groups: Independent student "t" test was performed to assess the statistically significant difference in mean values between the groups for Visual Analogue Scale for Pain, Universal Goniometry for Shoulder Range of Motion and Shoulder Pain and Disability Index for Function.

For all statistical analysis, $p < 0.05$ was considered as statistically significant.

Results

A total of 80 subjects with adhesive capsulitis were screened for eligibility, amongst 77 subjects were included in the study trail. All the 77 subjects who met the inclusion criteria had undergone baseline assessment and included subjects were randomized into two groups consisting of 39 participants in group A and 38 participants in group B. In this study 36 participants completed training in Group A and 36 participants completed training in Group B with dropouts of 3 in Cyriax soft tissue release group and 2 in Active Release Technique. Comparison was done within the groups as well as in between the groups. So as to evaluate the intra group and inter group effect of Cyriax soft tissue release and Active Release Technique which are under considerations in the present study.

Table 1: Analysis of Mean Score of Vas from Pre Treatment between Group A and Group B

Group		Mean	SD	P value	Inference
VAS	A	6.52	0.84	0.887	Insignificant
	B	6.50	10.81		

Results: The above table 1 depicts that the pre-test mean Group-A (6.52) and Group-B (6.50) score of the Visual Analogue Scale between the two groups found to be statistically insignificant (p>0.005).

Table 2: Analysis of Mean Score of Vas from Post Treatment between Group A and Group B

Group		Mean	SD	P value	Inference
VAS	A	3.38	0.72	0.001	Highly Significant
	B	4.50	0.87		

Results: The above table 2 depicts that the post-test mean Group-A (3.3) and Group-B (4.5) scores of the Visual Analogue Scale between the two groups were found to be statistically highly significant (p<0.005).

Table 3: Analysis of Mean Score of Shoulder Flexion from Pre-Test In Between Group A and Group B

Group		Mean	SD	P value	Inference
FLEX	A	94 º	2.72	0.326	Insignificant
	B	94.6 º	2.76		

Result: The above table 3 and depicts that the pre-test mean Group-A (94º) and Group-B (94.6º) scores of shoulder flexion between the two groups were found to be statistically insignificant (p>0.005).

Table 4: Analysis of Mean Score of Shoulder Flexion Post-Test In Between Group A and Group B

Group		Mean	SD	P value	Inference
FLEX	A	125º	3.02	0.001	Highly Significant
	B	110º	3.15		

Results: The above table 4 depicts that the post-test mean Group-A (125º) and Group-B (110º) scores of shoulder flexion between the two groups were found to be statistically highly significant (p<0.005).

Table 5: Analysis of Mean Score of Shoulder Abduction from Pre Test in Between Group A and Group B

Group		Mean	SD	P value	Inference
ABD	A	80.5º	6.36	0.930	Insignificant
	B	80.3º	7.01		

Results: The above table 5 depicts that the pre-test mean Group-A (80.5º) and Group-B (80.3º) mean score of shoulder abduction between the two groups found to be statistically insignificant (p>0.005).

Table 6: Analysis of Mean Score of Shoulder Abduction Post Test in Between Groups

Group		Mean	SD	P value	Inference
ABD	A	110º	6.36	0.0001	Highly significant
	B	98.1º	7.29		

Results: The above table 6 depicts that the post-test mean Group-A (110) and Group-B (98.1) mean score of shoulder abduction between the two groups found to be statistically highly significant (p<0.0005)

Table 7: Analysis of Mean Score of Shoulder Internal Rotation Pre Test in Between Groups

Group		Mean	SD	P value	Inference
INT.ROT	A	46.0º	2.21	0.959	Insignificant
	B	46.0º	2.73		

Results: The above table 7 depicts that the post-test mean Group-A (46.05º) and Group-B (46.08 º) mean score of shoulder internal rotation between the two groups found to be statistically insignificant (p>0.959)

Table 8: Analysis of Mean Score of Shoulder Internal Rotation Post Test in Between Groups

Group		Mean	SD	P value	Inference
INT. ROT	A	60.0º	2.64	0.0001	Highly significant
	B	52.3º	2.24		

Results: The above table 7 depicts that the post-test mean Group-A (60.0º) and Group-B (60.0º) mean score of shoulder internal rotation between the two groups found to be statistically highly significant (p<0.0005)

Table 9: Analysis of Mean Score of Shoulder External Rotation Pre Test in Between Groups

Group		Mean	SD	P value	Inference
EXT. ROT	A	50.02º	5.10	0.886	Insignificant
	B	50.19	4.82		

Results: The above table 7 depicts that the pre-test mean Group-A (50.02º) and Group-B (50.19º) mean score of shoulder external rotation between the two groups found to be statistically highly significant (p>0.005)

Table 10: Analysis of Mean Score of Shoulder External Rotation Pre Test in Between Groups

Group		Mean	SD	P value	Inference
EXT. ROT	A	71.0º	4.41	0.0001	Highly Significant
	B	61º	4.53		

Results: The above table 10 depicts that the post-test mean Group-A (71.08º) and Group-B (61º) mean score of shoulder external rotation between the two groups found to be statistically highly significant (p<0.0005)

Table 11: Analysis of Mean Score of Spadi Pre Test in Between Groups

Group		Mean	SD	P value	Inference
SPADI	A	48.05	4.76	0.705	Insignificant
	B	48.13	4.57		

Results: The above table 10 depicts that the post-test mean Group-A (71.08º) and Group-B (61º) mean score of SPADI between the two groups found to be statistically highly significant (p<0.0005)

Table 12: Analysis of Mean Score of Spadi Post Test in Between Groups

Group		Mean	SD	P value	Inference
SPADI	A	32.3	4.52	0.0001	Highly significant
	B	39.3	0.92		

Results: The above table 10 depicts that the post-test mean Group-A (32.3) and Group-B (39.3) mean score of SPADI between the two groups found to be statistically highly significant (p<0.0005)

Conclusion

The current study concluded that a 4-week intervention of Cyriax soft tissue release (CSTR) and active release technique (ART) both led to significant improvements in pain, range of motion, and function in subjects with frozen shoulder. However CSTR was found to be significantly more effective than ART in reducing pain intensity, improving active shoulder range of motion (flexion, abduction, internal rotation and external rotation), and diminishing functional disability. From the findings of the current study, it can be recommended that Cyriax soft tissue release may be opted as a treatment of choice for the effective managements of subjects with frozen shoulder

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