

EFFECTIVENESS OF POSTERIOR CAPSULE STRETCHING VERSUS ANTERIOR CAPSULE STRETCHING WITH CONVENTIONAL PHYSIOTHERAPY IN PATIENTS WITH FROZEN SHOULDER: A THREE-ARM COMPARATIVE STUDY

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ABSTRACT

Frozen Shoulder (Adhesive Capsulitis) is a common musculoskeletal condition characterized by pain, progressive restriction of shoulder range of motion (ROM) and functional disability. Capsular tightness, particularly involving the anterior and posterior portion of glen humeral joint, plays a significant role in limiting mobility. Although conventional physiotherapy is widely used, the effectiveness of targeted capsular stretching technique remains unclear. To compare the effectiveness of posterior capsule stretching versus anterior capsule stretching, along with conventional physiotherapy, in patient with frozen Shoulder. Group A (Posterior capsule stretching + conventional physiotherapy), Group B (Anterior capsule stretching + conventional physiotherapy), Group C (Conventional physiotherapy only).

Interventions will be administered for 4 weeks, 5 sessions per week. Outcome measures will include Visual Analog Scale (VAS), Shoulder Pain and Disability Index (SPADI), and shoulder ROM measured using a universal goniometer. Both stretching groups are expected to show superior improvement compared to conventional physiotherapy alone. Posterior capsule stretching may demonstrate greater gains in internal rotation and shoulder function.

Keywords: Adhesive capsulitis, frozen shoulder, posterior capsule stretching, anterior capsule stretching, physiotherapy, and shoulder rehabilitation.

INTRODUCTION

Adhesive capsulitis of the shoulder, commonly known as frozen shoulder, is a painful and debilitating musculoskeletal condition characterized by the progressive loss of both active and passive range of motion (ROM) of the glen humeral joint. This impairment significantly affects activities of daily living and overall quality of life.

Frozen shoulder typically progresses through stages from initial pain and inflammation (“freezing”), to significant stiffness (“frozen”), and finally gradual improvement (“thawing”), although the natural history can be protracted and variable. The pathophysiology involves an inflammatory process leading to fibrosis and contracture of the joint capsule, resulting in thickening and reduced capsular compliance, particularly in the rotator interval and axillary recess. Physiotherapy is widely recognized as a cornerstone of conservative management, aiming to reduce pain, improve ROM, and restore shoulder function. A variety of modalities have been studied, including manual therapy techniques, joint mobilization, therapeutic exercises, and targeted capsular stretching³. Although systematic reviews support physical therapy for improving shoulder mobility, current evidence remains inconclusive regarding the superiority of individual techniques or specific stretching approaches. Despite the theoretical rationale for region-specific stretching, comparative clinical evidence differentiating anterior versus posterior capsule stretching when combined with conventional physiotherapy is limited⁵. Some studies suggest that posterior capsular interventions can improve ROM and functional outcomes when applied alongside other therapeutic techniques, but definitive conclusions on optimal stretching directions are yet to be established. A comparative investigation of posterior versus anterior capsule stretching combined with conventional physiotherapy is essential to clarify which approach may confer greater benefits in terms of pain reduction, ROM improvement, and functional recovery in patients with frozen shoulder.

RESEARCH PROBLEM

Frozen shoulder causes significant functional limitation and reduction in quality of life. Frozen shoulder is a common condition causing pain, restricted range of motion, and functional limitations. Although conventional physiotherapy is widely used, outcomes are often slow and variable. Capsular tightness, particularly in the anterior and posterior regions, plays a key role in movement restriction. This study may help clinicians identify the optimal stretching intervention for improving outcomes in patients with adhesive capsulitis.

AIM OF THE STUDY

To compare the effectiveness of posterior capsule stretching versus anterior capsule stretching with

conventional physiotherapy in patients with frozen shoulder.

1. To evaluate the effect of posterior capsule stretching on pain, shoulder range of motion, and functional disability in frozen shoulder.
2. To evaluate the effect of anterior capsule stretching on pain, shoulder range of motion, and functional disability in frozen shoulder.
3. To compare the outcomes between posterior capsule stretching and anterior capsule stretching groups.

OBJECTIVES OF THE STUDY

1. To assess improvement in shoulder ROM using goniometry.
2. To assess functional improvement using SPADI.
3. To compare the effectiveness among the three intervention groups.

HYPOTHESIS: Null Hypothesis (H_0)

There will be no significant difference among posterior capsule stretching, anterior capsule stretching, and conventional physiotherapy in improving pain, ROM, and functional disability in frozen shoulder patients.

METHODOLOGY

Study Design	Study Setting	Study Duration	Sample Size	Sampling Technique
Randomized three-arm comparative study	Bharam Shakti sanjeevni hospital, Diwan hospital, Active life physiotherapy advance clinic, Bahadurgarh	4 Weeks	30	Convenient sampling with random allocation

INCLUSION CRITERIA

- Patients aged 40–60 years
- Clinically diagnosed cases of frozen shoulder
- Both genders
- Pain and restricted shoulder movements for more than 3 months.

EXCLUSION CRITERIA

- Recent shoulder fracture or surgery
- Rotator cuff tear
- Neurological involvement
- Severe osteoporosis

GROUPING

- Group A (Posterior capsule stretching + conventional physiotherapy)
- Group B (Anterior capsule stretching + conventional physiotherapy)
- Group C (Conventional physiotherapy alone)

INTERVENTION PROTOCOL

Conventional Physiotherapy

- Moist heat pack for 15 minutes
- Pendulum exercises
- TENS

Posterior Capsule Stretching Technique

- Patient lies on affected side
- Shoulder positioned at 90° flexion
- Therapist stabilizes scapula
- Gentle internal rotation stretch applied
- Hold for 30 seconds
- 5 repetitions

Anterior Capsule Stretching Technique

- Shoulder abducted and externally rotated
- Gentle anterior capsular stretch applied
- Hold for 30 seconds
- 5 repetitions

OUTCOME MEASURES

Primary Outcome Measures

1. Visual Analog Scale (VAS)
2. Shoulder ROM using universal goniometer
3. Shoulder Pain and Disability Index (SPADI)

PROCEDURE

Subjects meeting inclusion criteria will be selected after obtaining informed consent. Baseline measurements of pain, ROM, and functional disability will be recorded.

Participants will then be randomly allocated into three groups. All interventions will be administered for 4 weeks. Post-treatment measurements will be recorded at the end of intervention.

RESULT

Data obtained from the study were coded and entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 25.0. The level of significance was set at $p < 0.05$. Within-group analysis will be performed using paired t-test. Between-group comparison will be carried out using one-way ANOVA. Level of significance will be set at $p < 0.05$.

Table: 1 Baseline Characteristics of Subjects- Age group

Variable	Group A (n=15)	Group B (n=15)	Group C (n=15)
Age (years)	52.3 ± 6.1	51.7 ± 5.8	53.1 ± 6.4

Table: 2 VAS

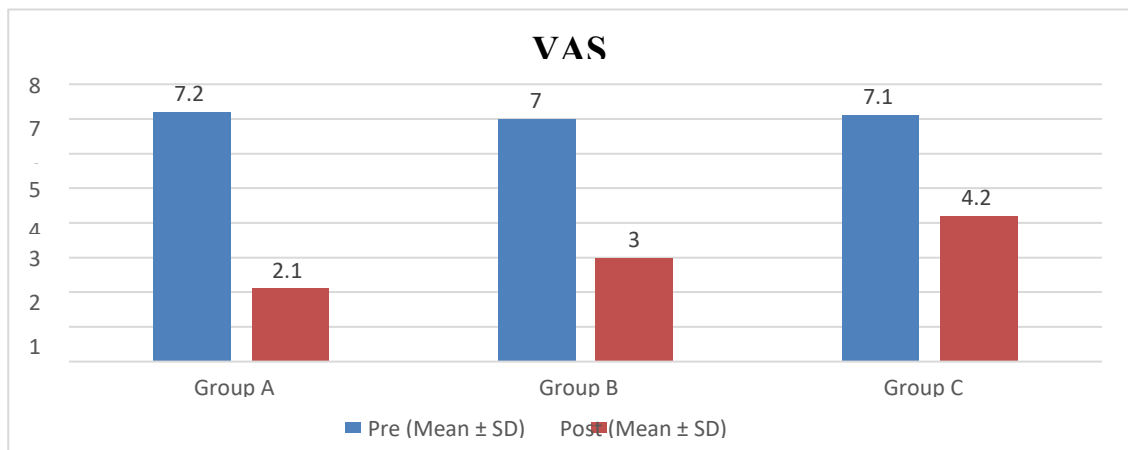


Table: Within-Group Comparison of ROM (Shoulder Abduction)

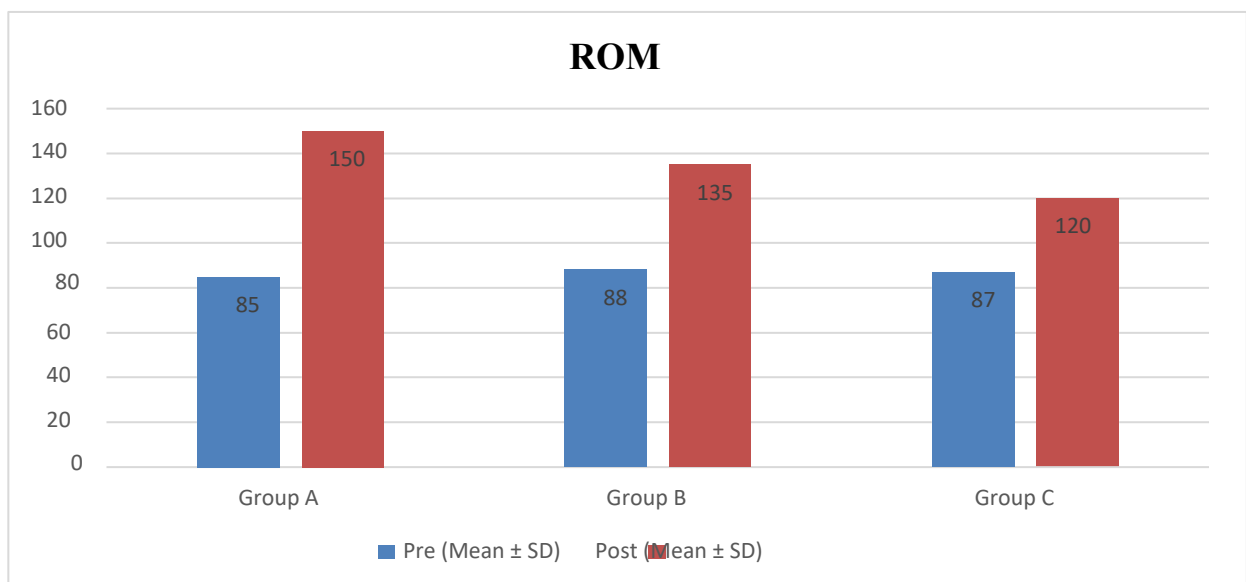


Table: Within-Group Comparison of SPADI Score

Variable	Pre (Mean ± SD)	Post (Mean ± SD)	paired t-test.	p-value
Group A	72 ± 6	25 ± 5	19.10	<0.001
Group B	70 ± 7	35 ± 6	15.42	<0.001
Group C	71 ± 6	45 ± 7	11.25	<0.001

A total of 30 participants completed the study and were equally allocated into three groups. Within group analysis using paired t-test showed statically significant improvement ($p < 0.001$) in pain (VAS),

range of motion (ROM), and functional disability (SPADI) in all three group following the intervention. However, the magnitude of improvement was highest in Group A (posterior capsule stretching with conventional physiotherapy), and least in Group C (Conventional Physiotherapy alone).

Between-group analysis using one-way ANOVA revealed a statistically significant difference among the groups for all outcome measures (VAS: $F = 18.56$, ROM: $F = 22.48$, SPADI: $F = 30.25$; $p < 0.001$). Post hoc analysis further indicated that Group A showed significantly greater improvement compared to Groups B and C, while Group B also demonstrated better outcomes than Group C. These findings suggest that posterior capsule stretching combined with conventional physiotherapy is more effective in reducing pain, improving shoulder mobility, and enhancing functional outcomes in patients with frozen shoulder.

Table: Between-Group Comparison (Post-Test Values)

Outcome	Group A	Group B	Group C	F-Value	p-value
VAS	2.1 ± 0.7	3.0 ± 0.8	4.2 ± 0.9	18.56	<0.001
ROM (Abduction)	150 ± 12	135 ± 10	120 ± 11	22.48	<0.001
SPADI	25 ± 5	35 ± 6	45 ± 7	30.25	<0.001

ETHICAL CONSIDERATIONS

- Ethical clearance will be obtained from the Institutional Ethics Committee.
- Written informed consent will be obtained from all participants.
- Confidentiality and anonymity of subjects will be maintained.
- Participants will have the right to withdraw at any stage.

DISCUSSION

Subjects meeting inclusion criteria will be selected after obtaining informed consent. Baseline measurements of pain, ROM, and functional disability will be recorded.

Participants will then be randomly allocated into three groups. All interventions will be administered for 4 weeks. Post-treatment measurements will be recorded at the end of intervention.

STATISTICAL ANALYSIS

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CONCLUSION

The present study concludes that all three interventions posterior capsule stretching, anterior capsule stretching, and conventional physiotherapy are effective in reducing pain, improving range of motion, and enhancing functional outcomes in patients with frozen shoulder. However, posterior capsule stretching combined with conventional physiotherapy demonstrated significantly greater improvement compared to anterior capsule stretching and conventional physiotherapy alone. Therefore, posterior capsule stretching can be considered a more effective and clinically beneficial intervention in the rehabilitation of patients with adhesive capsulitis.

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