



## Original Article

### Comparative Effects of Routine Physical Therapy versus Intra-Articular Steroids in Patients with Chronic Frozen Shoulder

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#### ABSTRACT

**Background:** Frozen shoulder presents clinically as shoulder pain with progressive confined movement, both active and passive, along with normal radiographic scans of the glenohumeral joint. Frozen shoulder is a common problem in current healthcare practice. The condition for a long time is ill-diagnosed and treated by painkillers without assessing the exact problem in the joint. **Objective:** To compare the effects of routine physical therapy versus intra-articular steroids in patients with chronic frozen shoulders. **Methods:** A quasi-experimental study was conducted in an Orthopaedic Center in Shujabad in June 2023. The age range of the participants was 25 to 55 years. The sample size was 78 patients using a non-probability purposive sampling technique and were divided into two groups with 39 in each group. The Numeric Pain Rating Score, Shoulder Pain and Disability Index and goniometer were used as a tool for data collection. The subjects were asked for follow-up on the 15<sup>th</sup> day twice in the 1<sup>st</sup> month then at the end of the 2<sup>nd</sup> and 3<sup>rd</sup> month for follow-up and assessment. Mann-Whitney U test and Friedman tests were applied. Descriptive data is presented as frequency and percentages. **Results:** The p-value of the Friedman test is less than 0.05 so a statistically significance difference is found in Group B before, during and after intervention. According to the Mann-Whitney U test, the p-value of the SPADI score baseline is more than 0.05 which shows that no statistically significance difference is found in both groups' baseline SPADI score. The mean rank of Group A is less than Group B which shows that there is more improvement in Group A as compared to Group B. **Conclusion:** According to the results, this study concluded that the data collected through Shoulder Pain and Disability Index, the disability index and pain perception were the main outcomes of our study. When we saw group A with conventional physical therapy protocol the outcome was far better in terms of disability limitation and decrease in pain. The joint range of motion in frozen shoulder completely gained after physiotherapy but intra-articular steroid group B only reduced pain.

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## INTRODUCTION

Shoulder stiffness is a sign of several connected illnesses, the causes of which are complicated and multifaceted. These disorders are treated empirically and in a multifaceted manner. Up to 4% to 5% of the general population can experience the painful condition known as adhesive capsulitis. There is no recognized reason for a primary, or idiopathic, frozen shoulder; a secondary frozen shoulder develops instead when a recognized cause, such as a systemic condition like diabetes or trauma, is present. Patients often show up after their women are more inclined than men to have the condition in their fifth decade of life although Bunker hypothesized that both sexes experience it equally. Both of the shoulder joints are impacted in as many as 17% of individuals. Within five years of the initial shoulder issue being resolved, the other shoulder joint is affected. A primary frozen shoulder can develop without a known trigger or reason. It entails a protracted inflammatory process in which fibroblasts multiply as a result of an overreactive immune response. As a result of pain inhibition (antalgic shoulder) or muscle weakness (such as a torn rotator many people present with painful shoulder problems that make their shoulders look "stiff" by restricting their active movement (cuff or deltoid paresis).

Some passive and vigorous shoulder motions are painfully restricted, in contrast, this is a defining hallmark of patients with frozen shoulders, even when radiographs are normal. There are three clinical stages for primary frozen shoulder: the difficult part patients have mild to moderate dull aching discomfort, similar to rotator cuff tendinosis and impingement syndrome, even when at rest. Synovitis is the cause of it and lasts for nine months called the phase of freezing or stiffening. It is a continuation of the initial phase, in which the discomfort is lessened but

the capsular scarring limits movement. The scapulohumeral rhythm is poor. It can last up to a year. The third stage is thawing. The gradual and consistent return of shoulder function is what distinguishes this. Pain is relieved by capsular remodelling, although some functional residue is left behind.<sup>1</sup> There are two causes for this. First, commonly used terminology like "frozen shoulder," "adhesive capsulitis", and "pericapsulitis" can be abused by patients and physicians because they are either vague or misleading. Second, although the recognition of distinctive clinical symptoms is necessary for the syndrome's identification, there are no established diagnostic standards. This study compares the efficacy of treating adhesive capsulitis (AC) with kinematic mobilization (KM) and thermotherapy combined with intra-articular steroid injections alone. It aims to assess the effect on shoulder mobility, general function, and discomfort. Although each therapy has demonstrated its advantages, this study aims to identify the best strategy for controlling AC by comparing the effectiveness of the two approaches in terms of pain relief and mobility enhancement.<sup>2</sup>

Diabetes mellitus and frozen shoulder are commonly associated; in fact, up to 71.5% of instances of frozen shoulder also involve a risk of diabetes. Based on abnormal fasting blood sugar or glucose tolerance test findings, around half of these individuals are diagnosed with pre-diabetes; the remaining patients are classified as having Type I or Type II diabetes. Frozen shoulder affects around 4% of diabetics, and the condition's lifetime risk is 10–20%, twice or four times higher than that of the general population.<sup>3</sup> Recently, the need for standards in diagnosis has been underlined, and a consensus-based vocabulary and classification system would be helpful.<sup>3</sup> Clinically, a frozen shoulder is characterized by gradual restriction of shoulder motion, both passively and actively, and normal

glenohumeral joint radiological scans. Prognostically, it often advances through three overlapping stages: stiffness (Stage 2, lasting 4–12 months), pain (Stage 1, lasting 2–9 months), and recovery (Stage 3, lasting 5–24 months).

This is an approximate duration, though, and many individuals may still be experiencing symptoms after six years. Its incidence was estimated to be 2.4 per 100,000 people annually by observational research centred in primary care, and its prevalence ranged from less than 1% to 2% of the population. The disorder most frequently linked to a frozen shoulder is diabetes mellitus. It is estimated that as many as 71.5% of people have both frozen shoulders and a susceptibility to diabetes. Of the majority of these patients, about half have pre-diabetes with abnormal fasting blood sugar or glucose tolerance test results, while the remaining patients have Type I or Type II diabetes that has previously been diagnosed. A frozen shoulder can occur in 4% of diabetics at a lifetime risk of 10% to 20%, which is two to four times higher than the risk in the general population.<sup>4</sup> Frozen shoulder is a common problem in current healthcare practice. The condition for a long time is ill-diagnosed and treated by painkillers without assessing the exact problem in the joint. Conventional therapy is easily accessible to the lower-class population. The primary aim of this study is to make people aware of steroidal therapy and physical therapy to reduce the symptoms of a frozen shoulder. The objective of this study is to reduce pain intensity, decrease disability, and increase shoulder ROM and also provide awareness of the importance of Physical Therapy Techniques in the treatment of chronic frozen shoulder.

## METHODS

A quasi-experimental study was conducted at Farooq Orthopedic Center in June 2023. In

that study, the patients of frozen shoulder were included. Non-probability Purposive sampling technique was used. This study stated that data was collected from Farooq Orthopedic Center Shujabad. After taking a permission letter from the Times Institute and consent form from participants, use the Shoulder Pain and Disability Index (SPADI) score to measure the initial or baseline problem on the first visit of the patient. The goniometer was also used to collect data on the range of motion of the shoulder joint at baseline and after every two weeks follow-up for the first month. The Numeric Pain Rating Scale (NPRS) was used for collecting data for my study to assess the pain condition of the patient at the 1<sup>st</sup> visit and after every two weeks follow-up then the next follow-up upon end of 2<sup>nd</sup> and 3<sup>rd</sup> months. The patients from two different groups aged between 25 and 55 years were purposively sampled in this study. In this procedure, 78 participants were included according to inclusion criteria. In group B, the 39 subjects with intra-articular steroids referred from the orthopaedic department were only assessed by numeric pain rating scale and shoulder pain and disability index. Then the subjects were asked for follow-up on the 15<sup>th</sup> day twice in the 1st month then at the end of the 2<sup>nd</sup> and 3<sup>rd</sup> month for follow-up and assessment.

In routine physiotherapy treatment, group A 39 subjects included, treated by application of ultrasound in pulse mode with moderate intensity with frequency of 1:4. For 5 minutes and at the end 20 repetitions of passive motion in every plane of movement and active range of motion done by shoulder wheel. In this group, the patient was treated for 15 days continuously then the first follow-up at the end of 1<sup>st</sup> month. Then for 2<sup>nd</sup> month, the home exercise plan is given to the patient and an assessment is done at the end of 2<sup>nd</sup> and 3<sup>rd</sup> month. Analysis of data was done by SPSS v.25. Mann-Whitney U and Friedman tests

were applied. The p-value less or equal to 0.05 was taken as significant. Descriptive data is presented as frequency and percentages.

## RESULTS

The p-value of the Friedman test is less than 0.05 so a statistically significance difference is found in Group B before, during and after intervention. According to the Mann-Whitney U test, the p-value of the SPADI score baseline is more than 0.05 which shows that no statistically significance difference is found in both groups' baseline SPADI score. The mean rank of Group A is less than Group B which shows that there is more improvement in Group A as compared to Group B. According to the Mann-Whitney U test, the p-value of the SPADI score during intervention is less than 0.05 which shows that there is a statistically significance difference is found in both groups during intervention SPADI score. The mean rank of Group A is less than Group B which shows that there is more

improvement in Group A as compared to Group B. According to the Mann-Whitney U test, the p-value of the SPADI score after the intervention is less than 0.05 which shows that there is a statistically significance difference found in both groups after the intervention SPADI score. After the intervention pain numeric rating scale (How would you rate your pain right now), scores mean and standard deviation were  $1.51 \pm 1.16$  and the median was 1.00 with a mean rank of 1.01. The p-value of the Friedman test is less than 0.05 so a statistically significance difference is found in Group A before, during and after intervention. The p-value of the Friedman test is less than 0.05 so a statistically significance difference is found in Group B before, during and after intervention. According to the Mann-Whitney U test, the p-value of the pain numeric rating scale score baseline is more than 0.05 which shows that no statistically significance difference is found in both groups' baseline NPRS score. According to

**Table 1:** Within-Group Comparison of SPADI Score of Group A and Group B (n=39)

Friedman Test Descriptive Statistics									
Groups		Mean	Std. Dev	Min.	Max.	Percentiles			Mean Rank
						25 <sup>th</sup>	50 <sup>th</sup> Median	75 <sup>th</sup>	
Group A (RPT)	At baseline	76.01	16.12	35.38	93.85	70.77	82.31	86.92	3.00
	During intervention	49.58	17.65	10.00	70.77	39.23	56.15	64.61	2.00
	After intervention	17.39	10.02	.77	41.54	10.00	16.92	23.07	1.00
Group B (Intra-articular steroid therapy)	At baseline	77.95	15.87	13.08	99.23	72.31	82.31	86.15	2.90
	During intervention	65.78	17.28	3.85	90.00	60.00	67.69	77.69	2.00
	After intervention	50.71	22.38	.00	83.85	36.15	51.54	68.46	1.10

**Table 2: Between-Group Comparison of SPADI Score of Group A and Group B (n=78)**

NPar Tests Mann-Whitney U Test Descriptive Statistics							
SPADI Score	Mean	Std. Dev	Min.	Max.	Percentiles		
					25 <sup>th</sup>	50 <sup>th</sup> Median	75 <sup>th</sup>
At baseline	76.98	15.92	13.08	99.23	71.92	82.31	86.15
During intervention	57.68	19.17	3.85	90.00	48.46	61.54	69.23
After intervention	34.05	24.04	.00	83.85	13.07	28.07	51.54

**Table 3: Mann-Whitney U Test Ranks Between Group Comparison of Group A and Group B**

Mann-Whitney Test Ranks				
SPADI Score	Group	N	Mean Rank	Sum of Ranks
At baseline	Routine physiotherapy	39	38.79	1513.00
	Intra-articular steroid therapy	39	40.21	1568.00
During intervention	Routine physiotherapy	39	28.78	1122.50
	Intra-articular steroid therapy	39	50.22	1958.50
After intervention	Routine physiotherapy	39	24.41	952.00
	Intra-articular steroid therapy	39	54.59	2129.00

the Mann-Whitney U test, the p-value of the NPRS score during intervention is less than 0.05 which shows that a statistically significance difference is found in both groups during intervention pain numeric rating scale score. The mean rank of Group A is less than Group B which shows that there is more improvement in Group A as compared to Group B. According to the Mann-Whitney U test, the p-value of the pain numeric rating scale score during intervention is less than

0.05 which shows that a statistically significance difference is found in both groups after the intervention pain numeric rating scale score.

**DISCUSSION**

It was demonstrated in a study that individuals with frozen shoulders benefit greatly from physiotherapy, exercise, and corticosteroid injections in terms of pain relief and increased range of motion. One of the most important

**Table 4: Mann-Whitney U Test Between-Group Comparison of Group A and Group B Pain Numeric Rating Scale**

Mann Whitney U test NPar Tests Descriptive Statistics							
	Mean	Std. Dev	Min.	Max.	Percentiles		
					25 <sup>th</sup>	50 <sup>th</sup> Median	75 <sup>th</sup>
From 0-10, how much do you perceive your pain?	7.8333	1.70116	2.00	10.00	7.0000	8.0000	9.0000
How would you rate your pain right now?	5.5769	2.05458	.00	9.00	4.0000	6.0000	7.0000
How would you rate your pain right now?	3.0513	2.55789	.00	9.00	1.0000	2.0000	5.0000

aspects of treating a frozen shoulder are patient education. The most often recommended course of treatment for people with frozen shoulder is physiotherapy. One of the often employed therapies is transcutaneous electrical nerve stimulation to relieve pain and restore range of motion through ultrasonic exercise.<sup>5</sup> For treating frozen shoulder, corticosteroid injections have long been recommended.<sup>6</sup> A research found that 73% of patients were right-handed and that 53% of the study group had a dominant arm impairment. The symptoms persisted for 5.79 months on average.

The patients in the exercise-treated group had better outcomes than the ones in the modalities or home exercise plan-treated group. Physical discomfort, psychological well-being, and social interaction all saw notable improvements over time within the SF-36 categories.<sup>7</sup> In prior research, it was established that patients with frozen shoulders who received Maitland mobilization or Kaltenborn mobilization had significantly

different pain and ROM for both internal and external shoulder rotation before and after the intervention.<sup>8</sup> Strong evidence supporting the short-term efficacy of laser treatment and steroid injections was discovered in the investigation, although moderate evidence supported the mid-term efficacy of steroid injections. The study demonstrated that mobilization did not yield superior results in terms of the short- or long-term aims of therapy.<sup>9</sup> A study discovered that while treating a frozen shoulder conservatively, arthrographic distension/hydrodilatation with corticosteroids improves the range of motion throughout all periods and relieves discomfort temporarily.<sup>10</sup> According to Martin J. Kelley's research, most patients will benefit from conservative treatments if they have a considerable reduction in pain, a recovery of their functional range of motion, and increased patient satisfaction. If conservative therapy fails, the patient with a stubborn frozen shoulder may consider manipulation and/or capsular release.<sup>11</sup> According to a study, physical therapy is considered so extensively

acknowledged that it ought to be utilized in the conservative care of a frozen shoulder. The intraarticular steroid injection is essential for lowering pain when the patient has severe discomfort in the early months, particularly within the first six weeks.<sup>12</sup> Individuals with frozen shoulders for affected limbs showed enhanced shoulder flexion, extension, abduction, and adduction active range of motion during a 4-week therapy period. Following four weeks of therapy, the discomfort subsided and the shoulder flexors, abductors, adductors, and internal rotators' muscle function improved.<sup>13</sup>

It was demonstrated in a publication that patients with adhesive capsulitis experienced less shoulder pain and greater range of motion and muscular strength when an at-home stretching program tailored to tissue irritation and particular shoulder mobility deficits (e.g., internal/external passive ROM at varying degrees of abduction) was coupled with a multimodal manual treatment method.<sup>14</sup> According to a comprehensive study, mobilization combined with a conventional physiotherapy program meant to treat frozen shoulder may be more successful in enhancing shoulder range of motion and minimizing discomfort.<sup>15</sup> Despite this, at the 6-month final follow-up, the three injection techniques provided equivalent clinical effects according to the available statistics.<sup>16</sup>

Shock wave therapy was found to be more successful than intra-articular articular therapy in improving shoulder pain, impairment level, and range of motion. In Ahmed Ebrahimerian's study, after three months of intervention, the group receiving shock wave therapy outperformed the group receiving intraarticular corticosteroid injections in terms of shoulder pain and disability level as well as shoulder range of motion. This improvement was further bolstered by higher glycemic control in the patients with diabetic adhesive capsulitis.

## CONCLUSION

This study concluded that by the data collected through SPADI, the disability index and pain perception were the main outcomes of our study. That study stated that in group A with conventional physical therapy protocol, the outcome was far better in terms of disability limitation and decrease in pain. The joint range of motion in frozen shoulder completely gained after physiotherapy but intra-articular steroid group B only reduced pain.

## DECLARATIONS

**Consent to participate:** Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.

**Availability of data and materials:** Data will be available on request. The corresponding author will submit all dataset files.

**Competing Interests:** None

**Funding:** No funding source is involved.

**Author contributions:** The author read and approved the final manuscript.

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