

# A Comparative Study of the Effect of Supervised Physiotherapy with or without Local Intra-Articular Corticosteroid Injection in Early Stage of Adhesive Capsulitis of the Shoulder

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## ABSTRACT

**Introduction:** In freezing phase of adhesive capsulitis intraarticular corticosteroid and/or physiotherapy are common treatment options. Physiotherapy is an established treatment. This study can help to know if steroids have any significant effect over physiotherapy. Study aimed to study the effectiveness of local steroid injection in early-stage adhesive capsulitis and to formulate guidelines for the treatment of adhesive capsulitis patients.

**Materials and methods:** 30 patients at a tertiary care hospital were randomly divided into two groups. The questionnaire Part A had sociodemographic details and Part B had Shoulder Pain and Disability Index. Group A participants were administered a 40 mg triamcinolone intraarticularly. Both groups were given physiotherapy. After 4, 6 and 8 weeks SPADI was again recorded for both groups.

**Results:** Mean age of Group A and B was  $54.2 \pm 7.2$  and  $48.5 \pm 6.9$  years respectively. There were 73.3 and 66.67 percent females in group A and B respectively. Change in SPADI for both groups at the end of week 4 and 6 were significant. After eight weeks, change in the Disability Score seen in Group A was  $51.09 \pm 2.6$ , and for Group B was  $23.42 \pm 1.26$ .

**Conclusion:** A combination of intra-articular steroids and physiotherapy for the treatment of adhesive capsulitis provides better results than just physiotherapy.

**Keywords:** Intraarticular, Steroid, Physiotherapy, Adhesive Capsulitis

anywhere between one to three years.<sup>7,8</sup>

The various treatment options can be conservative or operative. Under both of these types, primary regimens are intra-articular steroid injection, mobilization and physiotherapy, nonsteroidal antiinflammatory drugs (NSAIDs), oral steroid treatment, sodium hyaluronate intra-articular injection, suprascapular nerve block, arthrographic distension, mobilization under anesthesia (MUA), arthroscopy and open release.

Out of all the options available, intraarticular corticosteroid injection and/or physiotherapy programs are the two most common treatment options used widely.<sup>9</sup> However, clear evidence of the efficacy of any of these techniques is still uncertain about the boosting function and decreasing pain.<sup>10</sup> These treatment options are preferred over newer techniques, like manipulation under anesthesia and arthroscopic capsular release, because of the significant advantage of them being less invasive and more affordable.<sup>11</sup> The latter comes into play, especially while dealing with patients in a rural setup and the majority population being below the poverty line in those areas. There is much evidence suggesting the positive effect of corticosteroid injection on ROM (range of motion) and pain, but it still is not included in the regimen many times.<sup>12,13</sup> However, physiotherapy has already been an established treatment and is included in the regimen with much literature to support the same.<sup>1</sup>

The efficacy of each mode of treatment is assessed with the help of the Shoulder Pain and Disability Index (SPADI). This index is being used as a tool since it has shown to

## INTRODUCTION

Shoulder pain and disability are many times due to adhesive capsulitis.<sup>1</sup> It is characterized by a spontaneous onset of shoulder pain, which is accompanied by progressive limitation of both active and passive glenohumeral joint movement.<sup>2</sup> It affects approximately 2% to 4% of the global population.<sup>3,4</sup> High incidence of it is during the fifth and sixth decade of life with a higher frequency in women than men. The understanding of frozen shoulder's pathophysiology is still poor.<sup>4</sup> A theory comprising of an inflammatory cascade causing contracture of anterosuperior capsule and coracohumeral ligaments of the shoulder joint, is generally accepted. All these lead to the loss of passive external rotation.<sup>4</sup> Neviaser et al.<sup>6</sup> identified 4 stages of this adhesive capsulitis, which were correlated with clinical examination and histological features-the painful phase, the freezing, frozen, and thawing stages. This study deals with patients in the freezing stage. For the functional recovery, it may require

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be responsive to change over time for various patient populations, and it also can discriminate adequately between patients whose conditions have improved or deteriorated.<sup>14</sup> SPADI has proven to have better construct validity and responsiveness while evaluating the treatment in case of adhesive capsulitis when compared with other shoulder specific disability measures.<sup>15</sup>

This study aims to evaluate the additional value of corticosteroid injection in the management of early-stage adhesive capsulitis. This study can help to know if steroids do have any significant effect over physiotherapy.

Various studies have been done to determine the efficacy of intra-articular corticosteroids over physiotherapy and other treatment options in urban settings, but there are comparatively fewer studies carried out in rural settings.

Study aimed to study the effectiveness of local steroid injection in early-stage adhesive capsulitis and to formulate guidelines for the treatment of the outpatients with early stage adhesive capsulitis of the shoulder.

## MATERIAL AND METHODS

This was a prospective study conducted in Maharashtra. The period of study was from June 2019 to July 2019, and the subjects were the orthopedic outpatients of a 700 bedded, tertiary care hospital in a rural setting.

All patients in the outpatient department, satisfying the inclusion and exclusion criteria, were included in the study. The inclusion criteria for cases was all outpatients – above the age of 18 years, showing presence of pain in shoulder along with the restriction of both active and passive motions of the glenohumeral joint for  $\geq 25\%$  in at least 2 directions (abduction, flexion, external rotation, internal rotation), as compared with the standard value or with the contralateral shoulder, diagnosed of adhesive capsulitis and have been showing symptoms for less than or equal to three months and patients in the freezing stage of adhesive capsulitis. The exclusion criteria was all outpatients below the age of 18 years and unwilling to participate, patients whose adhesive capsulitis was secondary to any other cause, patients with uncontrolled Diabetes mellitus and hypertension and patients with a diagnosed adhesive capsulitis of more than three months and lastly all patients that have previously undergone manipulation or treatment for adhesive capsulitis of the same arm.

Final sample size was 30 after statistician consultation. Data collection started after obtaining the approval of the Institutional Ethics Committee of Medical College.

On getting written informed consent from all the patients, they were randomly divided into two groups by the even-odd method with an equal number of participants in each group- Group A and Group B.

The questionnaire consisted of two parts. Part A consisted of various sociodemographic details like age, gender, level of education, the status of employment, residence, and then other important parameters concerning adhesive capsulitis like – unilateral/ bilateral shoulder pain, unemployment due to AC, diabetes and the duration of current shoulder pain. All

this data was recorded and entered by the investigator. Part B of the questionnaire consisted of the Shoulder Pain and Disability Index. The SPADI (Shoulder Pain and Disability Index) of all participating individuals was recorded.

The SPADI has 3 parts to it- the total SPADI score, the disability score, and the pain score.

Group A participants were administered a 40 mg dose of intraarticular triamcinolone hexacetonide injection under aseptic conditions. Then both groups were given physiotherapy treatment for 4 weeks, with 3 sessions of 40 minutes per week. The patients were given treatments like IFT, active ROM exercises, and TENS. After 4 weeks, the SPADI was again recorded for both groups, and the same was done after 6 weeks, and 2 months.

The primary outcome parameter of this study was the change in the mean of total Shoulder Pain and Disability Index (SPADI) score at the end of 2-months. SPADI consisted of 13 questions divided into two domains (pain and disability). Item responses were rated on an eleven-point scale (0-10), leading to a score between 0 (best) and 10 (worst).

## RESULTS

Mean age of Group A was  $54.2 \pm 7.2$  years, whereas that of Group B was  $48.5 \pm 6.9$  years.

There were 73.3% of females in Group A, and the percentage of females in Group B was 66.67%. Women had a higher prevalence. 86.67 percent patients (13) in group A had unilateral shoulder pain while 80 percent patients (12) in group B had unilateral shoulder pain. Table 1 shows the Baseline Readings found before the treatment.

Four weeks after receiving treatment, the groups differed significantly with the primary outcome measure. Compared with baseline score the total SPADI scores had improved by a Mean  $\pm$  Standard Error of Mean (SEM) of  $19.23 \pm 2.4$ , in the group receiving both the corticosteroid injection and physiotherapy, which was significantly higher than the improvements of  $7.64 \pm 1.93$  observed in the group receiving only Physiotherapy. The change of the pain scores for both groups from baseline was  $18 \pm 2.66$ , in Group A and  $9.14 \pm 2.01$  in group B. Though the change was more in Group A than group B, the observed change was not clinically significant. The decrease of disability score for Group A was  $20 \pm 2.43$ , which was found to be clinically significant when compared with the change of  $7.17 \pm 2.2$ , as seen in Group B. While determining the Significance of the difference between two Means for small samples, “t-test” is used instead of the “Z test.” As our sample size is small, we will thus be using the “t-test.”

The Degree of freedom (df) was calculated by using the formula -

$$\text{Degrees of freedom} = n_1 + n_2 - 2 = 15 + 15 - 2 = 28$$

Wherein  $n_1$  and  $n_2$  was the sample size in each group. Therefore, for this study, we had 28 degrees of freedom.

The value in “t table” at 28 degrees of freedom = 2.05, at a 95% (0.05) level of significance. If the value was  $> 2.05$ , then the data was significant.

The  $t_{28}$  was calculated for both groups, wherein the means of

Baseline SPADI Before Treatment						
	Total score		Pain score		Disability score	
	A	B	A	B	A	B
Mean ± SD	68.87 ± 13.18	61.23 ± 10.34	68 ± 14.62	60.47 ± 10.67	69.42 ± 12.95	62.17 ± 11.02
SPADI= Shoulder pain and disability Index, PT= Physiotherapy, CS= Corticosteroid Injection, SD= Standard deviation.						

**Table-1:** The Baseline Readings found before the treatment.

	Group A, CS + PT	Group B, PT only
	(n = 15)	(n = 15)
Observed Difference between two means (Comparing it at baseline and week 8)	-19.23	-7.640
Standard error of Difference between two means (Comparing it at baseline and week 8)	4.152	3.268
t- statistic	4.632	2.338
Significance Level	P < 0.05	P < 0.05

**Table-2:** Applying test of significance at week 4

Mean ± SEM change from baseline at week 6		
SPADI	Group A, CS + PT	Group B, PT only
	(n = 15)	(n = 15)
Total score	36.87 ± 1.49	16.26 ± 1.34
Pain score	32.83 ± 2.06	17.27 ± 1.82
Disability score	39.84 ± 1.67	16.09 ± 1.62

**Table-3:** Change of SPADI at the end of 6 weeks for both groups.

Mean ± SEM change from baseline at week 8		
SPADI	Group A, CS + PT	Group B, PT only
	(n = 15)	(n = 15)
Total score	50.05 ± 2.3	23.33 ± 1.1
Pain score	48.4 ± 2.13	23.94 ± 1.53
Disability score	51.09 ± 2.6	23.42 ± 1.26

**Table-4:** Change of SPADI at the end of 8 weeks (2 months) for both groups

the total SPADI score recorded before the treatment and the score at the end of 4 weeks were considered. Two  $t_{28}$  values were thus obtained one for Group A " $t_{28a}$ " and the other was " $t_{28b}$ " for Group B of the study (table-2).

Change in SPADI for both groups at the end of week 6 was significant at 95% confidence interval (table-3).

After eight weeks of the start of treatment, the SPADI was evaluated for the last time, and the change of the Mean of total SPADI Scores, from baseline, with the Standard Error of Mean for the same was calculated as seen . It revealed that the change of total SPADI scores for Group A was  $50.05 \pm 2.3$ , which was significantly higher than the change seen for Group B at  $23.33 \pm 1.1$ . The table also shows that the change in the Pain Scores was  $48.4 \pm 2.13$  and  $23.94 \pm 1.53$  for Group A and Group B, respectively. The amount of change in the Disability Score seen in Group A was  $51.09 \pm 2.6$ , and the same for Group B was  $23.42 \pm 1.26$  (table-4).

After performing all three t-tests for weeks 4, 6, and 8; it can be stated that the change in the SPADI score from baseline was significant at all three selected time intervals for both the treatment groups.

After analyzing the data and performing all the appropriate tests to the same, it can be inferred that, even though both

treatment groups decreased the SPADI score significantly, the group receiving both intra-articular corticosteroids and physiotherapy benefit more from the treatment in terms of the decrease seen in shoulder pain and disability than the group receiving just physiotherapy.

This difference between both the treatment groups is also significant, with a positive outcome towards the group receiving both physiotherapy and steroid injection.

### DISCUSSION

The present study was a prospective longitudinal study, carried out at a tertiary care hospital in a rural setting. The study aimed at comparing the effect of supervised physiotherapy with or without local intra-articular corticosteroid injection in the early stage of adhesive capsulitis of the shoulder. Adhesive capsulitis of the shoulder till date remains a mystery and is a difficult problem to manage. The various treatment modalities in use support the fact that little is known about the natural history, inciting etiology, the pathogenesis and response to treatment. Treatment with physiotherapy and intra-articular steroid injection are still the most widely used treatment modalities used in the country. This study revealed that even though both treatment options showed significant improvement in the SPADI, the progress seen in the group receiving both Physiotherapy and intra-articular corticosteroid injection (Group A) surpassed the progress seen in the other group receiving only Physiotherapy (Group B). The study also found that the addition of an intra-articular corticosteroid into the treatment regimen can improve the shoulder pain and range of motion of the joint much effectively.

The Mean Age of the patients in our study was  $54.2 \pm 7.2$  years in Group A, and  $48.5 \pm 6.9$  years in Group B. This finding is similar to the findings in many other studies too.<sup>17,18</sup> The study conducted by Satya Pal Sharma et al.,<sup>17</sup> in Norway with 106 participants shows that the change of Means of the total SPADI score at the end of week 8 from baseline for patients receiving steroid injection is of 40 points, whereas in our study the change is significantly higher at 50.05 points at the end of the 8<sup>th</sup> week.

In a study conducted by Simon Carette et al.<sup>1</sup>, that took place in Quebec and Ontario, Canada with a sample size of 97



patients, there were 46.2% females in the group being treated with only physiotherapy while in our study there were more females than male in the same group (Group B) i.e., there were 66.67% females. In another study conducted by Mobini Maryam et al.<sup>18</sup> on 87 patients from a rheumatology clinic in Sari, Iran; there were 96.3% females in the group receiving only physiotherapy. These significant differences seen in the preceding example might have been due to difference in the sociodemographic status of both places and even the small sample size of this study. Many other research papers have shown the increased prevalence of adhesive capsulitis seen among women.<sup>16,17</sup>

The Pain score seen at baseline in our study for the group receiving steroid injection and physiotherapy is  $68 \pm 14.62$  while the same for the group receiving only Physiotherapy is  $60.47 \pm 10.67$ . However, in the study conducted by Mobini Maryam et al.,<sup>18</sup> the Pain scores at baseline for both the groups in the same order are  $32.58 \pm 12.63$  and  $31.22 \pm 11.58$ . The study has a relatively greater decrease in the pain score than our study. The increase in Pain score in our study might be because of changes in the socio-demographic conditions of both places.

Our reports thus confirm those reported by Simon Carette et al.,<sup>1</sup> showing that the beneficial effects of the addition of single intra-articular corticosteroid injection are superior to those of just a supervised physiotherapy program.

In the study conducted by Simon Carette et al. the change in the mean of total SPADI score with the standard error of the mean for group receiving steroids and physiotherapy at the end of 6 weeks was  $46.5 \pm 5.3$ , while the same in our study was  $36.83 \pm 1.49$ . The same score for the group receiving only physiotherapy at the end of 6 weeks in that study was  $22.2 \pm 4.8$  and in our study was  $16.26 \pm 1.34$ .<sup>1</sup>

The results of our study indicate the combination of a single intraarticular injection of corticosteroid administered along with physiotherapy is superior to a 12-session supervised physiotherapy program in decreasing shoulder pain and disability at 8 weeks for patients with adhesive capsulitis of the shoulder.

## CONCLUSION

It could be well concluded that a combination of intra-articular steroids and physiotherapy for the treatment of adhesive capsulitis provides better results than just physiotherapy.

It was also observed that adhesive capsulitis is more prevalent in females than in males. People in and above their 4th decade of life have higher chances of developing adhesive capsulitis. When a combination of intra-articular corticosteroid is used with physiotherapy, it has the capacity to decrease shoulder pain and discomfort in less than four weeks. The degree of improvement seen in shoulder pain and disability for both groups of our study was higher than many other studies.

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