

## Frozen Shoulder - Comparison of Physiotherapy Alone And Along With Subacromial or Combined Subacromial and Intraarticular Steroid Injections

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### Abstract :

**Introduction:** Symptomatic improvement after sub-acromial steroid injections, in the initial part of treatment, has led us to conduct this study that compares the effects of physiotherapy alone, and combined with sub-acromial injection and also combined with both intra-articular and sub-acromial steroid injections for primary frozen shoulder.

**Material and Method:** 75 patients with primary frozen shoulder were randomly divided into 3 groups: group 1 for physiotherapy only, group 2 for the sub-acromial injections followed by physiotherapy and group 3 for sub-acromial and intra-articular injections followed by physiotherapy. Patients were evaluated using a visual analog scale for pain, Constant score, range of motion and American Shoulder and Elbow Surgeons Score at 3, 6 and 12 weeks after starting treatment.

**Results:** There was significant improvement in all parameters in Group 2 and 3 at 3 & 6 weeks. There was no difference between the groups at 12 weeks follow up. Group 2 and 3 were similar in outcomes at all follow ups.

**Conclusion:** Steroid injections followed by physiotherapy were superior to physiotherapy alone for patients with primary frozen shoulder as they led to earlier pain relief. Steroid injection combined with physiotherapy is an alternative modality for treatment of primary frozen shoulder.

**Keywords** – adhesive capsulitis, frozen shoulder, glenohumeral, physiotherapy, steroid injections, subacromial.

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### I. Introduction

Frozen Shoulder, as described by Neviaser [1], is the most common cause of shoulder pain and disability in persons between 40 to 60 years of age [2-6]. It's a chronic progressive disorder characterized by synovial adhesions, joint cavity obliteration and capsular thickening leading to painful limitation of joint movements [7-9]. It can be posttraumatic (secondary) or may occur without any inciting cause (primary, idiopathic) [10]. Natural history is that of freezing, frozen and thawing eventually leading to slow, spontaneous and incomplete recovery of the joint movement within two to three years.

Various techniques described in management of frozen shoulder includes skillful neglect [11, 12], medical management [13], physiotherapy [14, 15], steroid injections [16, 17, 18], hydraulic distension [19, 20], suprascapular nerve blockade [21, 22, 23], manipulation under anesthesia [24, 25], arthroscopic release [26, 27, 28].

This study compared clinical efficacy of steroid injection to that of physiotherapy alone in patients with primary frozen shoulder. The purpose was to evaluate pain and function using VAS, range of motion, Constant score and American Shoulder and Elbow Surgeons score. Our hypothesis was clinical outcomes of steroid injections with physiotherapy would be better than physiotherapy alone in patients with primary frozen shoulder.

### II. Material and Method

75 patients with primary frozen shoulder within the age group of 30 years to 60 years were included and randomly assigned, using table of random numbers, to one of the three groups. Group 1 - patients who were managed with physiotherapy alone, Group 2 - patients who were given sub-acromial steroid injections followed by physiotherapy and Group 3 - patients managed with both sub-acromial and intra-articular steroid injections followed by physiotherapy. Maximum of three injections of 80 mg of triamcinolone (a synthetic long acting

steroid) with 5-7 ml of 0.5% of bupivacain solution, were given per patient and adverse reactions, such as pain after injection, hot flushes etc, following injections were noted. Patients were then followed up at 3, 6 and 12 weeks intervals and pain and shoulder functions were evaluated using VAS, Range of Motion, the Constant scores and the American Shoulder and Elbow Surgeon's score.

All the data were analyzed statistically using SPSS Statistical software (ver.20.0.0) and primer. All the quantitative variables were summarized in the form of Mean  $\pm$  SD. The difference between mean values of the three groups was analyzed using ANOVA one way test, which were further analyzed by using post hoc test (Tukey test) and within group comparison were done by using repeated measure ANOVA and for all the qualitative data were summarized in the form of proportions. The differences between proportions were analyzed using Chi square test. P values <0.05 were considered as Significant.

### III. Results

In this study, the mean age of the patients was  $50.28 \pm 6.59$  years. The mean age of group 1 was  $50.16 \pm 5.86$  years, in group 2, mean age was  $50.20 \pm 6.68$  years and group 3, mean age was  $50.48 \pm 7.40$  years. There was a slight male predominance in this study. 52% of the patient had right side involvement and rest 48% had left side according to side of extremities. 29 patients (9 each in group 1 & 3 and 11 in group 2) out of 75 i.e. 38.67% had diabetes.

In average lateral elevation, there was no significant difference observed among groups at the start of the study. At 3 weeks and 6 weeks follow up group 2 & 3 had significantly better average forward flexion and average lateral elevation but again at 12 weeks follow up there was not much difference in the values of average forward flexion and average lateral elevation between the three groups.

No significant difference was observed in internal rotation among the group at different time interval except at 3 weeks interval group 1 had significantly lower mean as compared to other two groups.

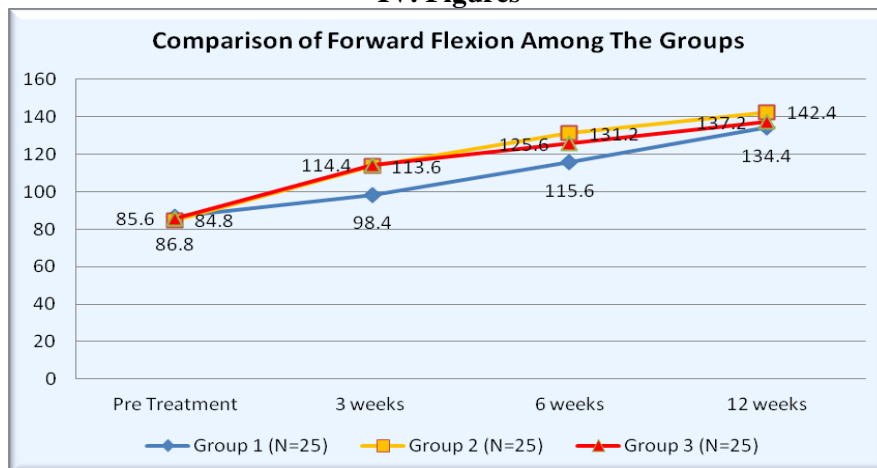
All three groups showed improvement in range of external rotation at the end of the study. But initially at 3 and 6 weeks follow up, group 2 and 3 showed significantly better improvement.

In this study, all three groups showed good improvement in average range of motion, average Constant Score, VAS Score and ASES Score at the end of the study. Group 2 and 3 had significantly better average score at 3 and 6 weeks follow up then group 1.

In group 1, a total of 14 patients had adverse reaction. Of which 5 patients had pain lasting for  $\leq 1$  day and 8 patients had pain lasting for  $> 2$  days. Facial flushing was seen in 2 patients, mild fever in 2 patients while 6 patients had other reactions (\*include slight swelling, tingling and radiating pain). None of the patients in group 1 had irregular menstrual bleed or skin irritation. 13 patients in group 2 and 14 patients in group 3 had adverse reactions. Of which 5 in group 2 and 4 in group 3 had pain lasting for  $\leq 1$  day and 5 in group 2 and 7 in group 3 had pain lasting for  $> 2$  days. Facial flushing was seen in 5 patients in group 2 and 4 patients in group 3. In group 2 and 3 respectively, 3 and 2 patients had irregular menstrual bleed, out of which only one patient in group 3 was in postmenopausal age. Mild fever was seen in 2 patients in group 2 and 3 patients in group 3. 1 patient each in group 2 and 3 complained of skin irritation. 4 patients in group 2 and 5 patients in group 3 had other minor reaction (\*\*include sweating, fatigue, dry mouth, dizziness and headache).

The results of this study were almost similar to those reported in literature when physiotherapy was compared to single or multiple sites and single or multiple local corticosteroid injections for the management of primary frozen shoulder.

### IV. Figures



**Fig. 1.** Average forward flexion

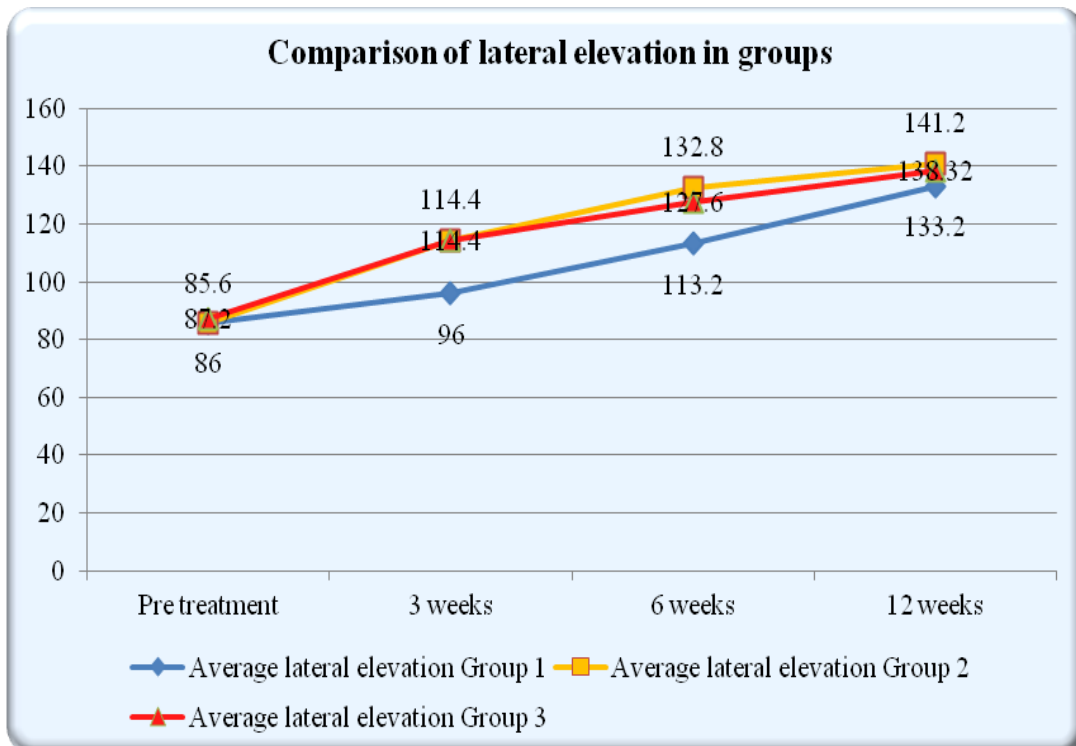


Fig. 2. Average lateral elevation

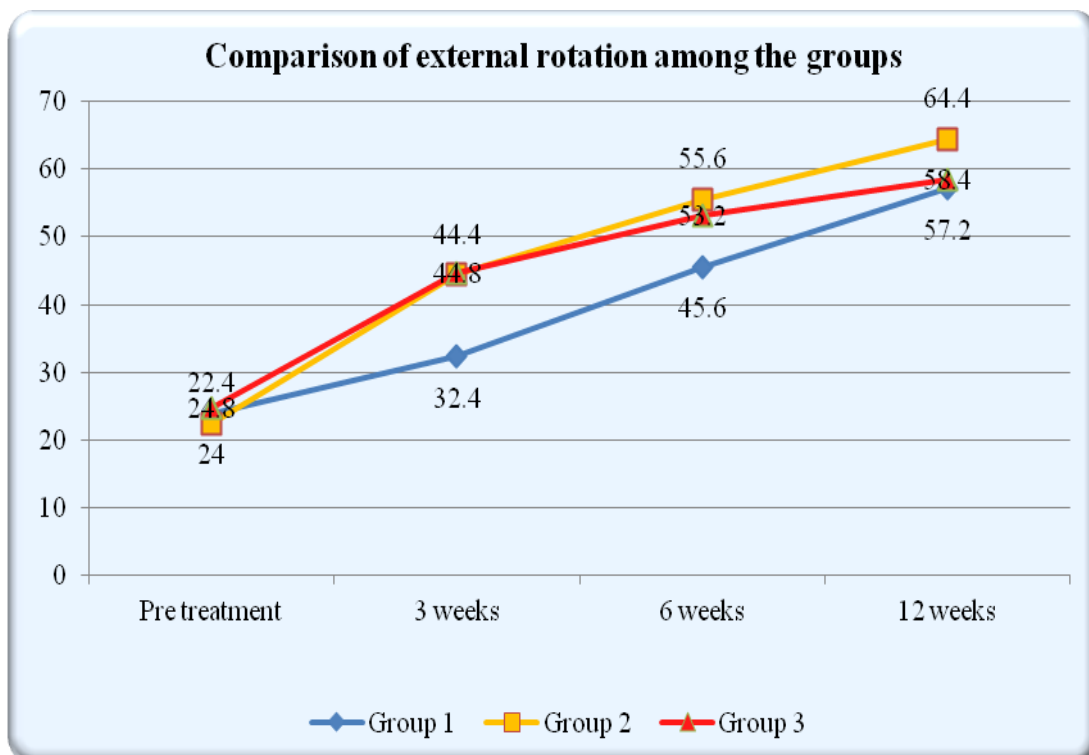


Fig. 3. Average external rotation

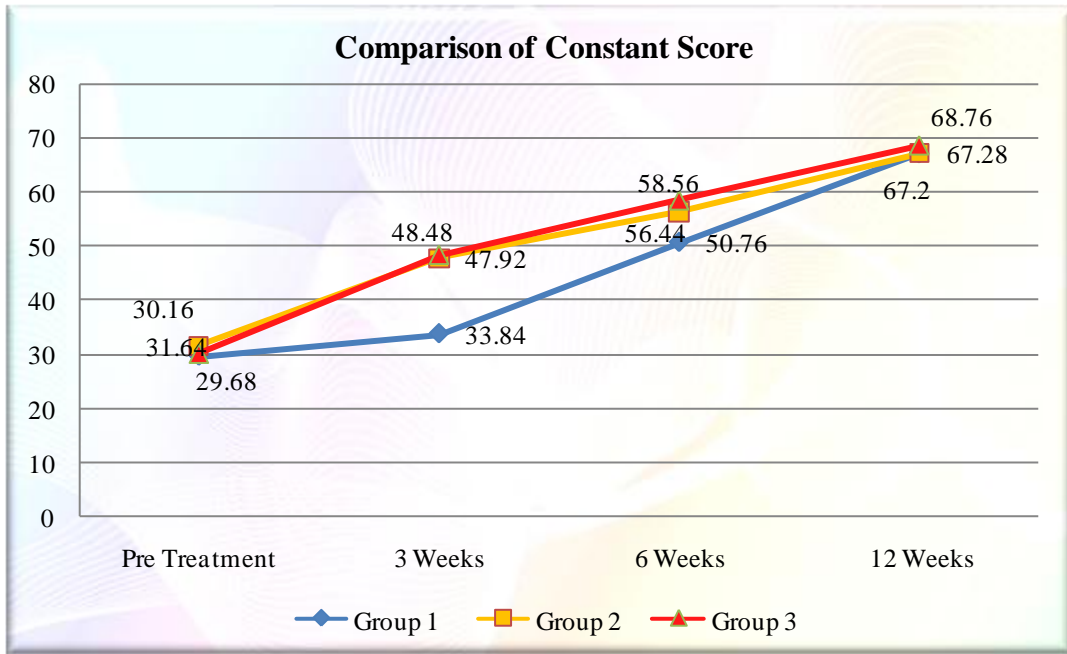


Fig. 4. Average constant score

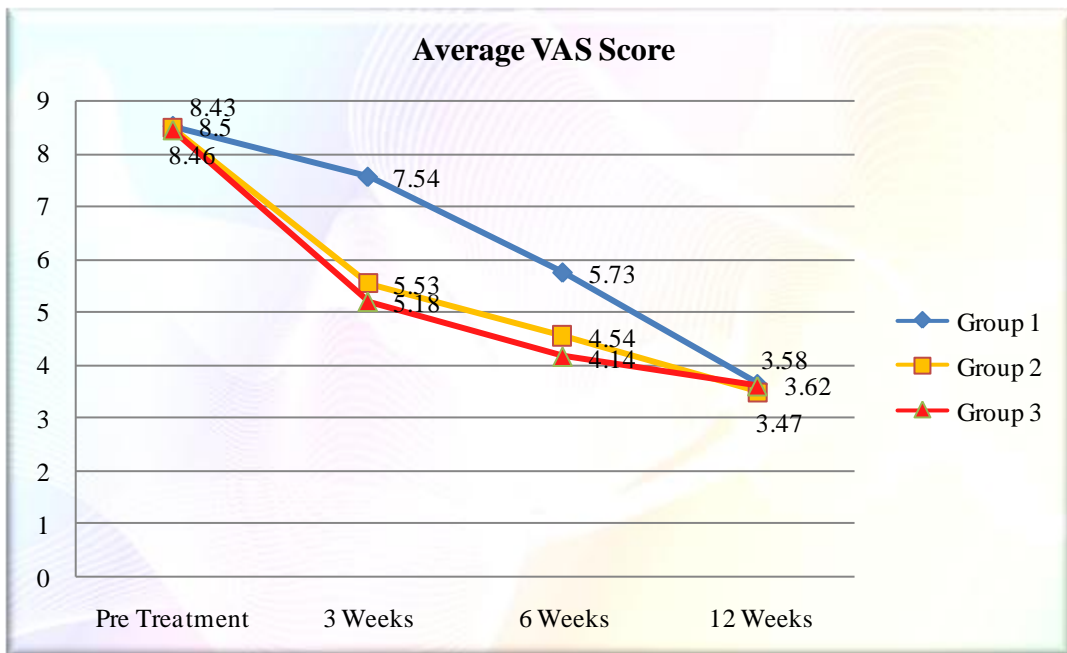


Fig. 5. Average VAS Score

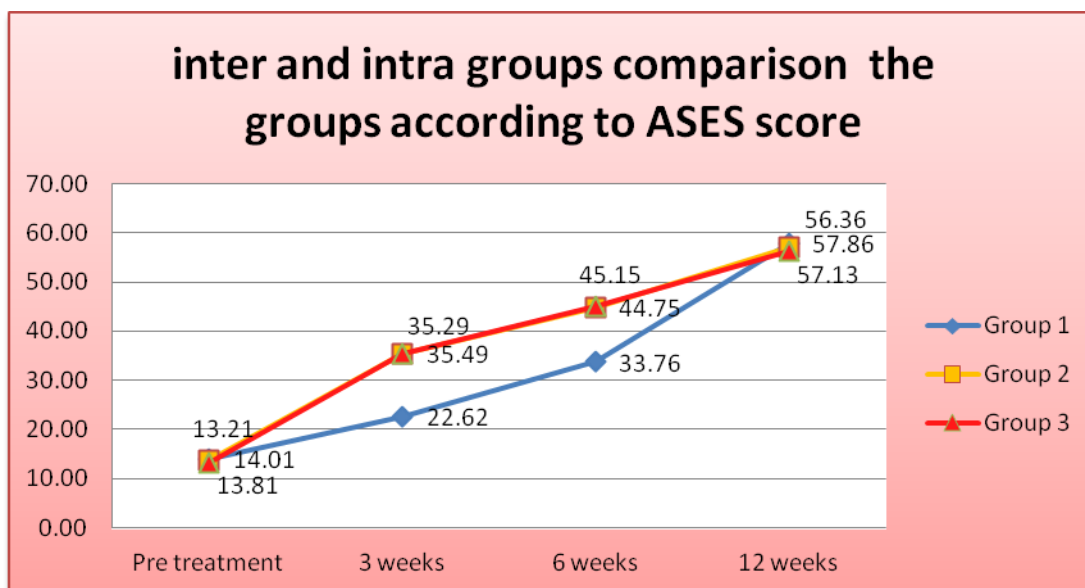


Fig. 6. ASES Score

## V. Discussion

Although FS is a self-limiting condition, it imposes such morbidity that patients and clinicians alike seek treatment interventions. No standard treatment regimen, however, is accepted universally. The disease mostly affects persons in 4<sup>th</sup> to 6<sup>th</sup> decade. In this study, mean age of patients was  $50.28 \pm 6.59$  years. The three groups were comparable on the basis of mean age of the patients.

Incidence of frozen shoulder is slightly higher in women than in men. But proportion of males was slightly higher in current study. There were 41 males as compared to 34 females. In between the groups, there was no significant difference with respect to sex distribution.

Frozen shoulder commonly occurs in diabetic patients. Bridgman [29] first described this association after observing a 10.8% incidence among 800 diabetic patients and only a 2.3% incidence in 600 non-diabetic patients. 29 patients (39%), out of 75, had history of diabetes.

Analgesics often are used for pain relief. Oral anti-inflammatory medications may also help to relieve pain and reduce the inflammatory reaction. Many medical practitioners prefer the intra-articular injection of steroids, accompanied by local analgesics and gentle active motion, in the freezing stage of FS. Local corticosteroid injections have been used with various results but, they produce a greater gain in motion recovery if used in combination with exercises. In this study, patients treated with corticosteroid injection followed by physiotherapy showed faster pain relief and shoulder function recovery than patients treated with physiotherapy alone. But the benefits of corticosteroids were not maintained beyond 6 weeks. There was no significant difference between the three groups at 12 weeks. Similar to the current study, majority of previous studies have shown that injected corticosteroids are probably of short term benefit in frozen shoulder cases. Bulgen *et al* [30] showed marked initial response in patients treated with corticosteroid but no significant long-term difference was found when compared to patients treated with physiotherapy or benign neglect. Shin and Lee [31] and Van Der Windt [32] also had similar results.

In this study, patients injected in the sub-acromial space showed similar reduction in pain and improvement in shoulder function as compared to the patients who received both sub-acromial and intra-glenoid injections. Han *et al* [33] concluded in his study comparing sub-acromial and gleno-humeral injections that no significant difference found between the sub-acromial and gleno-humeral group. Similarly Shin and Lee [31] compared various sites of injection and physiotherapy, and found that the efficacy of corticosteroid injection was not related to the site of injection.

In this study, injections were given using postero-lateral approach for sub-acromial and intra-glenoid injections. Tabola *et al* [34] compared the effects of corticosteroid injections given using anterior, posterior and supraclavicular approaches, but none of the approach was found to be superior to the other. Thus any of the approach can be used depending on the surgeon's choice.

Rizk *et al* [35] reported a randomized trial comparing 4 groups: intra-articular methylprednisolone and lidocaine injection, intrabursal methylprednisolone and lidocaine injection, intra-articular lidocaine injection, and intrabursal lidocaine injection. In their study, 40 mg of methylprednisolone was injected weekly for 3 weeks. There was no significant difference in outcomes between intrabursal injections and intra-articular injections. The

injection of steroids with lidocaine had no advantage over lidocaine alone in restoring shoulder motion; however, partial, transient pain relief occurred in two-thirds of the steroid-treated patients.

The limitation of this study was that more patients and a longer term follow up are necessary to prove our hypothesis. A sample size of 75 patients was relatively small to claim strong statistical power and further research with a larger number of patients is necessary. We believe that 3 months of follow up may be enough to compare the short term treatment effects. Finally, patients with different phases of the disease were present in each group which may have influenced clinical outcomes.

## VI. Conclusion

In view of good initial reduction in pain and gain in range of motion, local corticosteroid injections followed by physiotherapy can be tried in patients with primary frozen shoulder. Though there are some adverse reactions to steroid injection, but they are usually well tolerated.

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