

A Prospective Study to Evaluate the Outcome of Periarthritis Shoulder Treated with Platelet Rich Plasma

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Abstract: *Background:* Periarthritis shoulder also called as Adhesive capsulitis or Frozen shoulder. In the general population, the prevalence of adhesive capsulitis is 3 - 55%, and it is 20% in those with diabetes. Many types of treatment have been employed in the treatment of shoulder disorder such as simple analgesia, NSAIDS, intraarticular steroid, platelet rich plasma injection & surgery. Although this condition is associated with a number of risk factors, including female sex, trauma, age more than 40, thyroid disease, stroke, myocardial infarction, extended mobility and the existence off an autoimmune disease, the pathophysiology of this disorder is yet unknown. PRP has a low risk of immunological responses and the spread of infectious and dangerous diseases since it is an autologous biologic substance. It is vital to examine the use of PRP and evaluate its effectiveness in comparison to steroid injections given the backdrop of conflicting data for treatment modalities and the new introduction of PRP as a biological agent encouraging healing.

Keywords: Periarthritis, Platelet Rich Plasma, Randomized Controlled Trial, Triamcinolone

1. Introduction

Periarthritis shoulder also called as Adhesive capsulitis or Frozen shoulder. The body creates excessive adhesion across the glenohumeral joint as a result of the idiopathic, chronic, and indolent degenerative process known as periarthritis shoulder, which causes discomfort, stiffness, and a reduction in range of motion. It often appears between the ages of 40 and 70. In the general population, the prevalence of adhesive capsulitis is 3 - 55%, and it is 20% in those with diabetes. Although this condition is associated with a number of risk factors, including female sex, trauma, age more than 40, thyroid disease, stroke, myocardial infarction, extended mobility and the existence off an autoimmune disease, the pathophysiology of this disorder is yet unknown. According to a theory, stimulating synovitis causes the onset of a fibrotic cascade that might include growth factors like TGF beta. It's usual to think of adhesive capsulitis as having three phases. The first stage, known as "freezing", is characterised by escalating discomfort and stiffness that may last up to nine months. The second stage, referred to as "frozen", entails a constant condition for a duration of four to twenty months. The third stage, known as "thawing", is a time of spontaneous healing that may last anywhere between five and twenty-six months. On the basis of discomfort and a restriction in the shoulder's passive and active range of motion, this diagnosis is determined clinically. Among the suggested therapies are, intra-articular corticosteroid, benign neglect and hyaluronic acid injections, physical therapy, deep heat modalities, oral corticosteroids, manipulation under anaesthesia, surgical release and hydrodilatation. However, the best treatment option is a matter of debate. One of the methods often used to treat periarthritis of the shoulder is intra articular corticosteroid injection. In order to enhance and speed up tendon recovery, PRP has become a novel technique. It is described as an autologous blood sample with platelet concentrations

exceeding reference levels. PRP is more efficient and long-lasting than cortisone injection for the treatment of adhesive capsulitis, according to several research.

Aims and Objectives

To evaluate the outcome of Periarthritis shoulder treated with Platelet Rich Plasma in the form of:

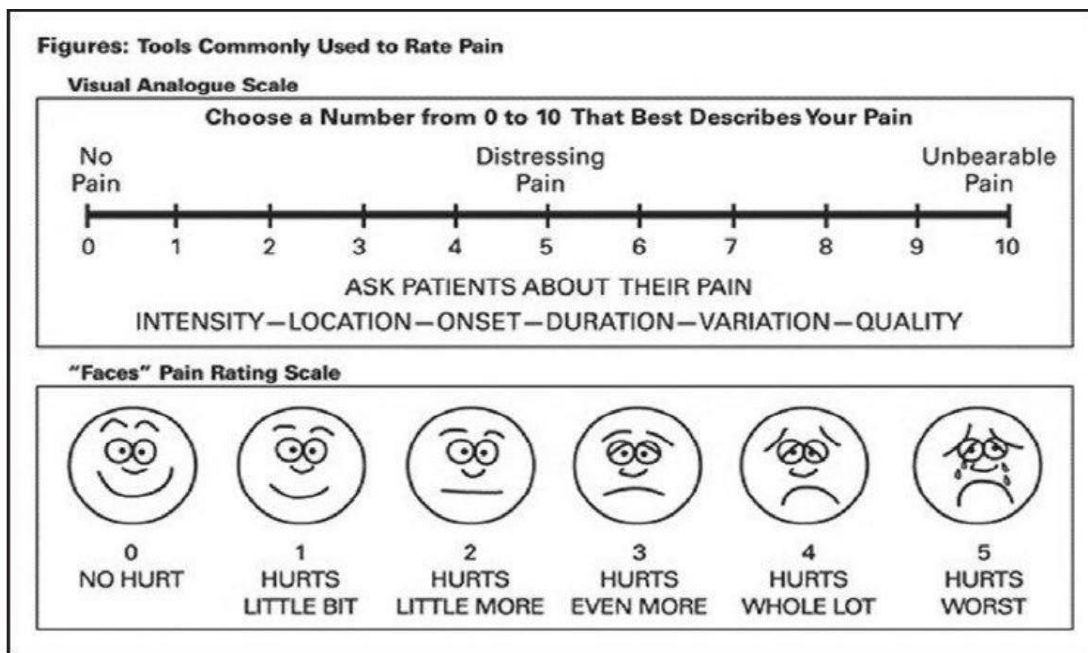
- 1) Intensity of pain reduced after the procedure.
- 2) Increase in shoulder joint degree of movements.
- 3) Ability of carrying daily activities without restrictions which the patients were not able to do before.

2. Materials & Methods

The research was done orthopaedic department of Narayana Medical College & Hospital, Nellore from November 2022 to June 2023 after getting ethical committee clearance. A total number of 30 patients in the age group of 35-60 years of either sex who are diagnosed with periarthritis shoulder for more than 4 weeks and not relieved by conservative treatment, patients with restricted active and passive movement at glenohumeral joint and patients giving informed consent for study were included in the study. Patients having chronic pain due to other causes like nerve damage or other neurological disorders, history of fracture around the shoulder joint, patients having local skin infection at the shoulder joint and patient not giving informed consent to be a part of study were excluded from the study. Patients clinically diagnosed to have Adhesive capsulitis inactive phase and after excluding all other causes of shoulder pain were subjected to ultrasonographic examination of the shoulder to diagnose Adhesive capsulitis. The supraspinatus movement restriction, thickened coracohumeral ligament (CHL), echogenic material surrounding the long head of the biceps at the rotator interval, and increased vascularity of biceps longhead at the rotator interval are all seen on ultrasound in cases of adhesive

capsulitis. Intraarticular Platelet rich plasma was introduced into the shoulder and the outcome was analyzed by Goniometer, Visual Analogue Scale and Shoulder Pain and

Disability Index pre procedure after 1 month, 3 months and at 6 months.



Visual Analogue scale

Shoulder Pain and Disability Index

Please place a mark on the line that best represents your experience during the last week attributable to your shoulder problem.

Pain scale

How severe is your pain?
Circle the number that best describes your pain where: 0 = no pain and 10 = the worst pain imaginable.

At its worst?	0	1	2	3	4	5	6	7	8	9	10
When lying on the involved side?	0	1	2	3	4	5	6	7	8	9	10
Reaching for something on a high shelf?	0	1	2	3	4	5	6	7	8	9	10
Touching the back of your neck?	0	1	2	3	4	5	6	7	8	9	10
Pushing with the involved arm?	0	1	2	3	4	5	6	7	8	9	10

Total pain score _____ / 50 x 100 = _____ %
(Note: If a person does not answer all questions divide by the total possible score, eg. if 1 question missed divide by 40)

Disability scale

How much difficulty do you have?
Circle the number that best describes your experience where: 0 = no difficulty and 10 = so difficult it requires help

Washing your hair?	0	1	2	3	4	5	6	7	8	9	10
Washing your back?	0	1	2	3	4	5	6	7	8	9	10
Putting on an undershirt or jumper?	0	1	2	3	4	5	6	7	8	9	10
Putting on a shirt that buttons down the front?	0	1	2	3	4	5	6	7	8	9	10
Putting on your pants?	0	1	2	3	4	5	6	7	8	9	10
Placing an object on a high shelf?	0	1	2	3	4	5	6	7	8	9	10
Carrying a heavy object of 10 pounds (4.5 kilograms)	0	1	2	3	4	5	6	7	8	9	10
Removing something from your back pocket?	0	1	2	3	4	5	6	7	8	9	10

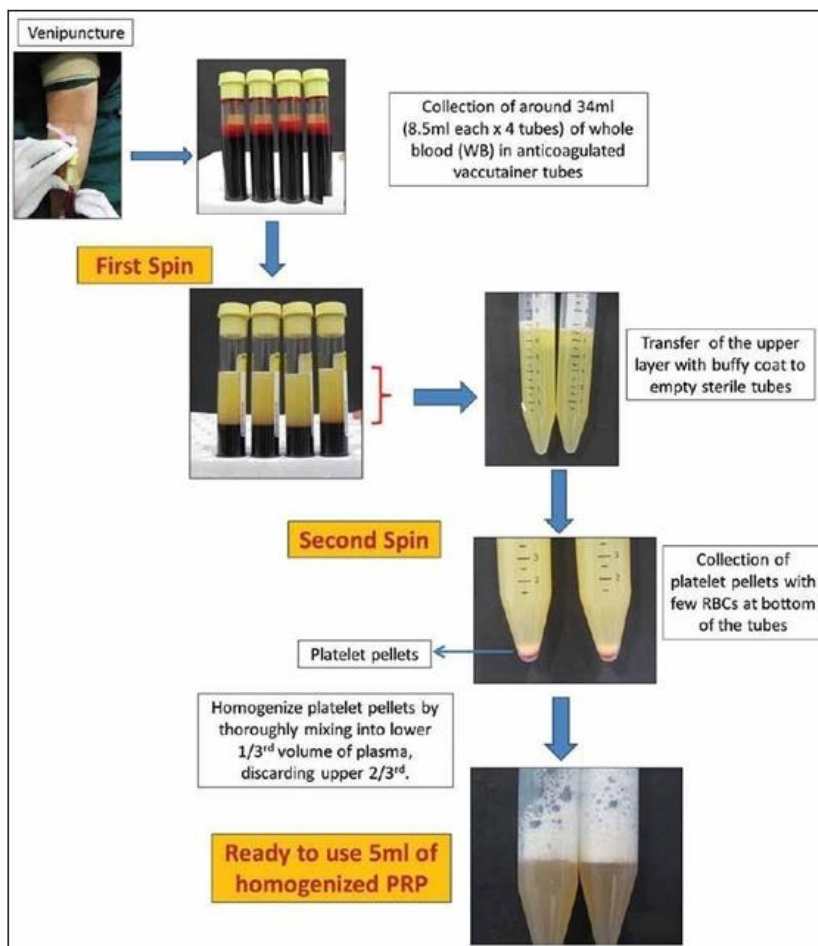
Total disability score: _____ / 80 x 100 = _____ %
(Note: If a person does not answer all questions divide by the total possible score, eg. if 1 question missed divide by 70)

Total Spadi score: _____ / 130 x 100 = _____ %
(Note: If a person does not answer all questions divide by the total possible score, eg. if 1 question missed divide by 120)

Shoulder Pain and Disability Index

All the recorded data were interpreted statistically by Paired t test and “p” value was calculated to conclude the thesis objectives statistically significant. Four 5 ml vacutainers containing about 20 ml of venous blood were filled with the sample, which was then transferred to a blood bank for PRP production. 10 minutes of initial centrifugation at 750 rpm.

The buffy coat's top layer was removed, gathered, and placed in empty tubes. A second centrifugation was carried out for 10 more minutes at 1750 rpm. Following this, 1/3 of the volume's top third will be discarded, and the bottom 2/3 will be collected as platelet-rich plasma. A total of 4ml of PRP was the finished result. All patients will first have their whole blood and rPRP tested for platelet counts.



Intervention: 4ml Intraarticular Platelet rich plasma was introduced with 18G needle through posterior approach after taking informed and written consent.

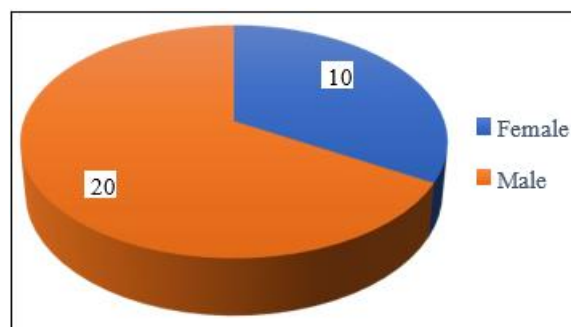
Sample Size Estimation: The data was analyzed using paired t test. The difference of pain relief between was statistically significant at both 3 months as well as 6 months follow up. The ROM for Extension, abduction and flexion increased by an average of 12.7°, 39.5° and 40° at 6 months follow up showing greater and better increase in ROM of shoulder with PRP. In our study paired t test was employed to know the efficacy of PRP. Our study inferred that the pain relief was better with PRP at 6 months as compared to 1 month and pre procedure. So over a short term period the pain relief is better with PRP. The difference between pre procedure and 6 months after introducing platelet rich plasma was statistically significant as indicated by the “p” value.

3. Results

This study included 30 patients, participants were clinically evaluated, baseline VAS scores, SPADI and ROM were recorded. Cases were treated with PRP after randomization. Patients were instructed to follow up with health care providers one month, three months, and six months following the treatment to see if their pain level had increased. Out of the 30 participants, 20 (66.66%) were males and 10 (33.33%) were females.

Table 1: Gender/Sex distribution of patients

Gender	Number of Cases
Female	10
Male	20
Total	30

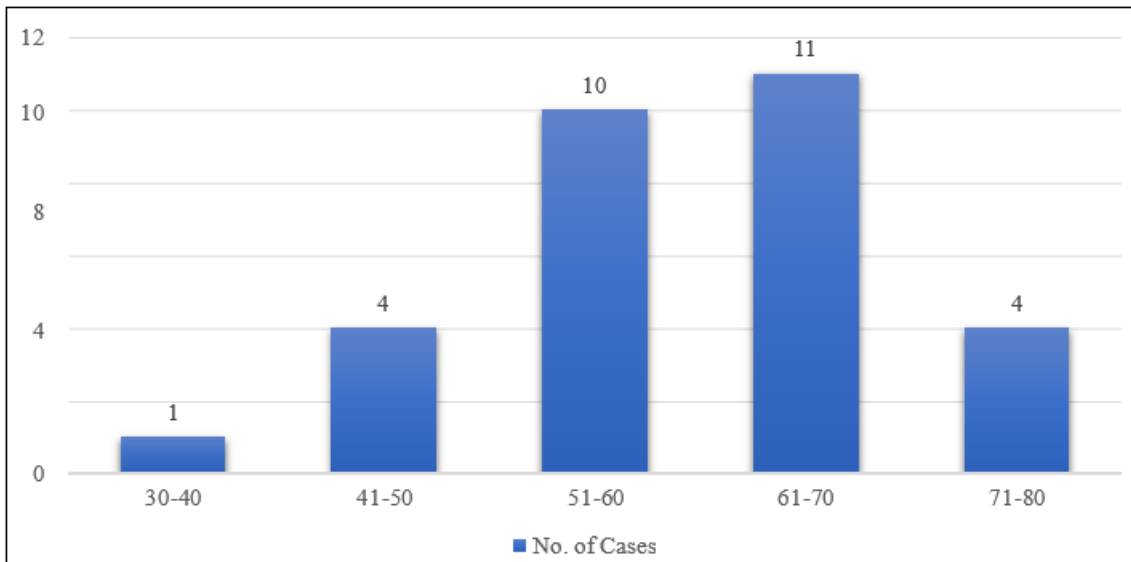


Graph 1: Gender/Sex Distribution

Most of the patients i.e., 21 (70%) in our study were aged between 50-70 years with an average age 59.33 years.

Table 2: Age distribution of patients

Age (In years)	Number of cases
30-40	1
41-50	4
51-60	10
61-70	11
71-80	4
Total	30
Mean ± SD	59.33±14.79



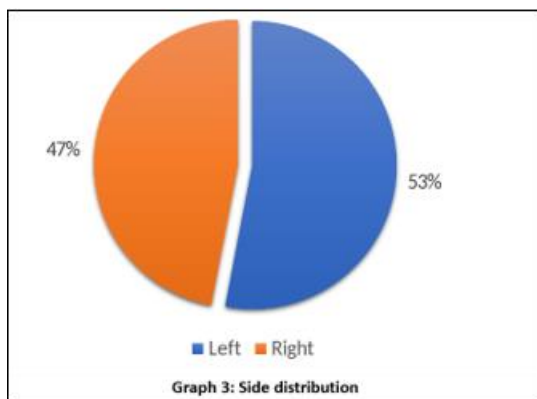
Graph 2: Age distribution

The mean age was 59.33 years with standard deviation 14.79. Out of the 30 participants, 16 (53%) participants had their right shoulder affected and 19 (47%) had their left shoulder affected. The mean duration of the condition in all 30 patients suffering from Adhesive capsulitis was 15.167+10.268 months.

Out of 30 participants 1 patient (3.33%) had transient hypotension, 1 (3.33) patient had nausea and 1 patient (3.33%) developed skin rashes along the upper limb after PRP injection.

Table 3: Side distribution in three groups of patients studied

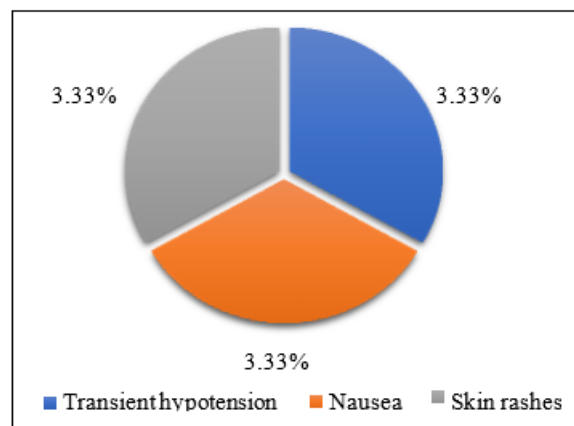
Side	Number of Patients (Percentage)
Right	16 (53%)
Left	14 (47%)
Total	30 (100%)



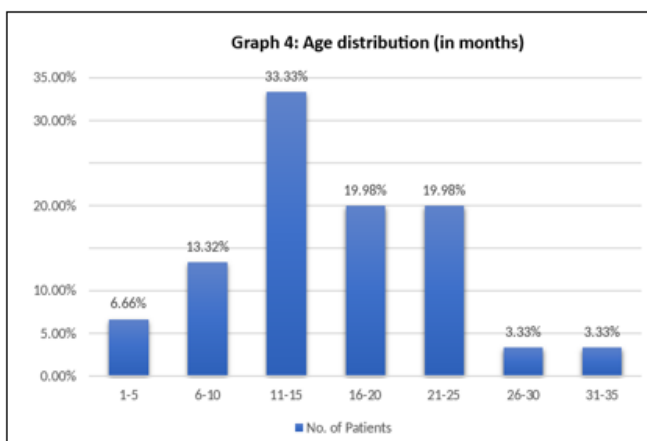
Graph 3: Side distribution

Table 5: Complication

Complication	No. of Cases
Transient hypotension	1 (3.33%)
Nausea	1 (3.33%)
Skin rashes	1 (3.33%)
Total	3 (10%)



Graph 5: Complication

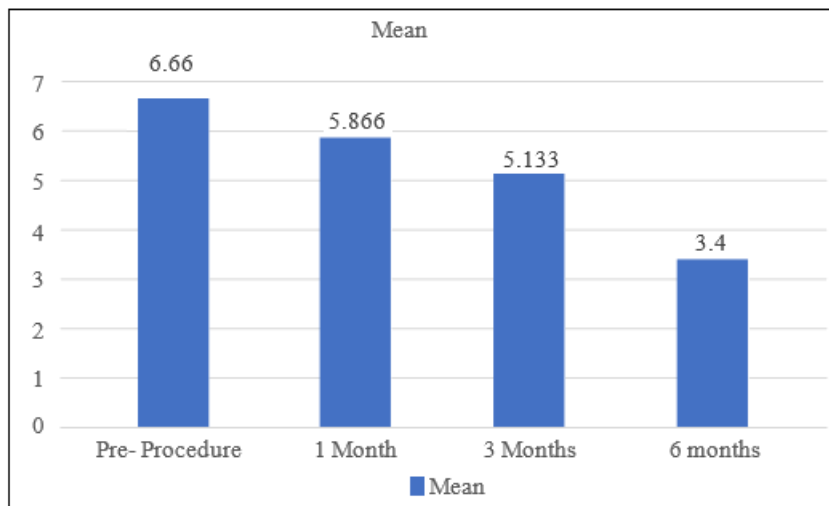


Graph 4: Age distribution (in months)

Decrease in VAS score at 3 months and at 6 months was statistically significant.

Table 6: Visual Analogue Scale Mean, Standard deviation and P Value

Time Frame	Mean	Standard Deviation	P value
Pre procedure	6.66	2.499	
1 months	5.866	1.408	0.131
3 months	5.133	1.384	0.004
6 months	3.4	1.473	0.001
Total	15.193	6.765	



Graph 6: VAS score distribution

There was a statistically significant reduction in the VAS score at 1 month, 3 months and 6 months by paired t test.

Table 7: Shoulder Pain and Disability Index Mean, Standard deviation and P Value

Time Frame	Mean	Standard Deviation	P value
Pre procedure	43.3	14.857	
1 months	50.53	14.811	0.0616
3 months	59.43	14.441	0.0001
6 months	74.76	10.926	0.0001
Total	177.49	55.025	

At 1-month SPADI score was 50.53 ± 14.811 as compared to base line 43.0 ± 14.857 with a p value of 0.0616 which is statistically not significant. At 3 months SPADI score was 59.43 ± 14.441 as compared to base line with a p value of 0.0001 which is statistically significant. At 6 months SPADI score was 74.76 ± 10.926 as compared to base line with a p value of 0.0001 which is statistically significant.

Table 8: Range of Movements Mean, Standard Deviation and P Value

Range of Movements	Time Frame	Mean	Standard Deviation	P value
Flexion	Pre Procedure	76	19.673	
	1 Month	86.16	21.043	0.062
	3 Months	100.6	22.757	0.0003
	6 Months	116.33	24.964	0.0001
Extension	Pre Procedure	18.6	7.846	
	1 Month	21.66	8.097	0.014
	3 Months	25.83	9.136	0.0017
	6 Months	31.33	8.158	0.0001
Abduction	Pre Procedure	87.33	21.476	
	1 Month	97.66	17.547	0.0582
	3 Months	108.166	16.657	0.00001
	6 Months	126.833	18.325	0.00001

Flexion, Extension and Abduction before Procedure



Flexion, Extension and Abduction After 6 Months**Statistical Methods**

Descriptive and inferential statistical analysis were carried out in the current study. Results for categorical data are reported in Number (%) while those for continuous measurements are presented as Mean SD (Min-Max). The significance is assessed at the 5% level of significance. The following assumptions on data is made, Assumptions: 1. Dependent variables should be normally distributed 2. Population samples should be chosen at random. To determine the significance of research parameters on a continuous scale, a paired t test was performed.

Statistical software: The Statistical software namely SPSS 22.0, and R environment ver.3.2.2 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables.

4. Discussion

Our study shows the mean age ranging from 40-60 years, in present study male are more affected than females and dominant hand is more involved than the non-dominant hand. Despite the majority of the available research showing a higher rate of participation of the non dominant side, the dominant side was more frequently involved than the non dominant side. However long term follow up studies, meta-analysis covering the larger segment of populations are awaited. Many authors have reported that peri-arthritis is a self-limiting condition, which acts for an average of 2-3 years. But, a considerable number of patients have notifying difficulties like limitation of movements for more than three years and a lesser significant number of people have residual disability. Up and about Within three years, 40% of patients still experience chronic symptoms. So, there is a need for the treatment for adhesive capsulitis. But, many randomized controlled trials provide an adequate information on the effectiveness of treatment including non steroidal anti-inflammatory drugs, corticosteroid injections and physiotherapys. Henceforth, there is a necessity for added well-designed clinical trials to study the efficacy of treatment for peri-arthritis. Autologous growth factors are hypothesised to promote an orderly angiogenesis and collagen regeneration throughout the healing process. In order to strengthen the specificity of the operation, the current research sought to assess the effectiveness and function of autologous Platelet rich plasma injection in adhesive capsulitis through posterior

route. In turn influencing the outcome. Most of the patients ages were 40 to 70 years. The average age was 59.33 ± 14.79 years. Kothari et.al. in their study observed that the mean age of all patients was 51.9 ± 10.1 years. A minor male predominance was seen in this investigation. However, this distinction lacked statistical significance ($P=0.825$). Crubbs et.al. study showed adhesive capsulitis is more common in middle aged women than males. Most of the patients presented with right shoulder involvement (53%) in the present study.

The improvement in pain relief and decrease in VAS score in our study was comparable to a study done by Madhanjayaraman et al at Davanagere in 2018, where it was determined that platelet rich plasma therapy is superior for adhesive capsulitis with p 0.001 for VAS score and 0.01 for DASH score, which is statistically significant compared to hydro dissection, and the patients who received it showed improved range of motion by the end of the first month of follow up.

The improvement in SPADI scores in our study was comparable to the improvement in SPADI scores in the study done by Calis et al 68 at Turkey which concluded when compared to baseline, there were substantial improvements in the SPADI pain, SPADI disability, and SPADI total scores in functional recovery ($p < 0.05$).

The improvement in ROM in our study was compared with a study done by Kothari et al 16 at Delhi in 2017 which concluded, PRP treatment resulted in statistically significant improvements over corticosteroid and ultrasonic therapy in active and passive range of motion of shoulder, pain (VAS) and function (Quick DASH) at 12 weeks. Pain relieved significantly in our study and improvement in SPADI scores and ROM for Extension, Abduction, Flexion at 6 months in platelet rich group. The restricted ROM at 6 months were very low and patients had regained more than 2/3rd of ROM in PRP group. There is limited data showing comparison between autologous PRP injection and corticosteroid injection in the treatment of adhesive capsulitis. However, the systematic reviews in terms of PRP and steroid group individually conclude better outcomes in both the groups, especially when USG guided compared to blind landmark based injections similar to the studies by Aly et al. concluded that sonography-guided corticosteroid injections are more

effective out of subacromial space. Lee et al. compared the results of sonography guided and blinded corticosteroid injections in a randomized controlled study on a 43 patients and found that there are significant differences in pain intensity, ROM and functional shoulder scores between two techniques.

5. Conclusion

This study concluded that intraarticular introduction of Platelet rich plasma in Periarthritis shoulder showed reduction in the intensity of pain, increase in angle of movements of shoulder joint and improvement in ability of carrying daily activities without restrictions which the patients were not able to do before.

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