# Comparison Of Intra-Articular Platelet Rich Plasma Versus Corticosteroid Injections For The Treatment Of Moderate Knee Osteoarthritis

**Abdul Rasheed Napar[1], Naveed Ahmed Solangi[2], Mehtab Shahni[3], Hafeezullah Ghumro[4], Naveed Ahmed Jumani[5], Aftab Hussain[6]**

[1,3] Assistant Professor Orthopedics, Khairpur Medical College.

[2] Associate Professor Orthopedics, Khairpur Medical College

[4,5] Senior Registrar, Khairpur Medical College

[6] Consultant Anaesthesiologist, CMH Kohat

**Author's Contribution**

[1,3,4,6] *Conception of study*
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[1,6] *Analysis/Interpretation/Discussion*
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[2,3,4,5] *Critical Review*
[1,2,3,4,5] *Facilitation and Material analysis*

**Corresponding Author**

*Dr. Abdul Rasheed Napar*
*Assistant Professor*
*Department of Orthopedics,*
*Khairpur Medical College*
*Khairpur*
*Email: dr.aries@yahoo.com*

## Abstract

**Objective:** To compare the efficacy of intra-articular injections of prednisolone acetate and platelet-rich plasma in cases of moderate knee osteoarthritis.

**Study design:** Prospective comparative study.

**Place and Duration of Study:** Department of Orthopedic Surgery, Khairpur Medical College, Khairpur Mirs, from January 2021 till December 2021

**Methodology:** A total of 100 patients were selected for the study and were randomly divided into two equal groups. Group C patients received intra-articular corticosteroid injection along with local anesthetic (Prednisolone acetate 40 mg + 3 ml of 0.5% bupivacaine) under ultrasound guidance. Group P patients received 3 injections of PRP, each of 8 ml volume given at one week's intervals. Patients with signs of hemodynamic compromise, sepsis, past history of any intra-articular injection in the same joint were also excluded from the study. Follow-up of patients was carried out at 1, 3, and 6 months. The Western Ontario and McMaster Universities Osteoarthritis (WOMAC) scale was used to assess the patients prior to injection and then at each follow-up. WOMAC scale consists of three subsets i-e pain, stiffness, and physical function.

**Results:** Demographic data were comparable between both groups. Pre-injection WOMAC score in group C and P was 71.54±12.18 and 75.20±8.58 respectively (p-value=0.086); after one month of injections, it was 34.20±10.48 and 35.38±6.31 respectively (p-value=0.580). After 3 months of injection, it was 33.20±8.13 and 31.10±5.50 respectively (p-value=0.195). After 6 months of injection, it was 35.32±10.41 and 32.10±6.63 respectively (p-value=0.68).

**Conclusion:** It is concluded in our study that intra-articular injections of prednisolone acetate and PRP are equally effective in patients of moderate knee osteoarthritis.

**Keywords:** Corticosteroids, intra-articular injections, knee osteoarthritis, knee pain, osteoarthritis, platelet-rich plasma, prednisolone acetate.

## Introduction

Osteoarthritis, also known as degenerative joint disease or wear and tear arthritis, is one of the most common diseases resulting in musculoskeletal disability [1]. It results in defects in the joint cartilage due to which underlying bone is exposed and affected. This disease significantly reduces the quality of life [2]. Osteoarthritis can involve any joint, but it usually affects the knees, hip joints, hands, and feet. Symptoms of this disease include pain, joint stiffness, swelling of the affected joints, limited joint mobility, and muscle wasting at the affected joint [3]. In osteoarthritis, synovial fluid in the joints has been found to contain many inflammatory mediators including C-reactive protein, prostaglandins, cytokines, complements, growth factors, and nitric oxide. All of these factors induce local proteinases and hence result in cartilage destruction [4].

The knee is the biggest synovial joint in the human body. It is the most common joint involved in osteoarthritis due to its high use and constant stress on this joint. There are two types of osteoarthritis. Primary, which is non-traumatic and idiopathic in nature, and secondary, which is secondary to mechanical misalignment or trauma [5]. Disease severity can be graded on the basis of radiological findings, a technique developed by Kellgren–Lawrence [6].

Conventional treatment strategies for the management of osteoarthritis which include the use of oral and topical non-steroidal anti-inflammatory drugs (NSAIDs), opioids, physiotherapy, and exercise have shown very limited benefits if any [7]. Newer modalities have shown very promising results which include intra-articular injections and transcutaneous electrical nerve stimulation (TENS) [8]. Intra-articular corticosteroid and platelet-rich plasma (PRP) injections have been used successfully in the recent past [9, 10]. Intra-articular corticosteroid knee injections provide pain relief from three to nine months on average, their exact mechanism of action is not exactly known but probably they do it with the virtue of their anti-inflammatory properties. PRP on the other hand, is believed to induce a regenerative response in the joint, though this fact is not fully proven yet.

The rationale of this study was to compare the efficacy of intra-articular knee corticosteroids versus PRP injections. The results of this study done on our local population will further strengthen the international evidence of these treatment modalities.

## Materials and Methods

This prospective comparative study was carried out in the orthopedic department, Khairpur Medical College, Khairpur Mirs from 1st January 2021 till 31 December 2021. Permission from the Ethical Review Board of the institute was sought before starting the study. Patients of either gender, with an age range between 30-70 years, body mass index (BMI) between 18 to 35 kg/m$^2$, reporting orthopedic OPD with a history of 4 months or more of the knee with a radiological finding of grade 2 or 3 Kellgren and Lawrence system for classification of osteoarthritis were selected for the study. Patients with uncontrolled diabetes, taking antiplatelet therapy/warfarin, any bleeding disorder, platelet count lower than 100000/mm$^3$, and BMI greater than 35 kg/m$^2$ were excluded from this study. Patients with a disease duration of more than 4 years were also excluded from the study. Written consent was taken from all the patients willing to participate in the study. A total of 100 patients were selected for the study and were randomly divided into two equal groups. Group C patients received intra-articular corticosteroid injection along with local anesthetic (Prednisolone acetate 40 mg + 3 ml of 0.5% bupivacaine) under ultrasound guidance. Group P patients received 3 injections of PRP, each of 8 ml volume given at one week's intervals. Patients with signs of hemodynamic compromise, sepsis, past history of any intra-articular injection in the same joint were also excluded from the study. Follow-up of patients was carried out at 1, 3, and 6 months. The Western Ontario and McMaster Universities Osteoarthritis (WOMAC) scale was used to assess the patients prior to injection and then at each follow-up. WOMAC scale consists of three subsets i-e pain, stiffness, and physical function [11].

Data was collected on an especially designed proforma and was transferred and analyzed with the help of Statistical Package for Social Sciences (SPSS) version 24. Qualitative data like gender, and severity grade of osteoarthritis were expressed as percentages and proportions, and quantitative variables like age, BMI, and WOMAC scale were expressed as mean ± standard deviation. Parametric tests (unpaired t-test) were used for normal distributions and the Mann-Whitney U test for non-parametric distributions. P ≤

0.05 was considered statistically significant. Data was stratified with respect to age, gender, and duration of symptoms.

# Results

The age range of the patients selected for this study was 46 to 70 years, with a mean and standard deviation of 58.96±6.44 years. The age range of the patients in group C was 47 to 70 years with a mean and standard deviation of 57.88±6.62 years. In group P, age ranged from 46 to 70 years with a mean and standard deviation of 60.04±6.12 years. The difference in age between both groups was not significant with a p-value of 0.093.

In group C, 26 (52%) patients were female and 24 (48%) were female with male to female ratio of 1:0.92. In group P, 23 (46%) patients were male, and 27 (54%) patients were female with male to female ratio of 1.13:1. The difference in gender between both groups was not significant with a p-value of 0.548.

The mean duration of symptoms in group C was 14.06±7.95 months, while it was 11.48±8.86 months in group P. The difference in the duration of symptoms between both groups was insignificant with a p-value of 0.128.

Out of 100 patients, 36 (36%) had grade 2 osteoarthritis and 64 (64%) had grade 3 osteoarthritis. In group C, 21 (42%) patients had grade 2 osteoarthritis while 29 (64%) patients had grade 3 osteoarthritis; while in group P, 15 (30%) patients had grade 2 osteoarthritis, and 35 (70%) patients had grade 3 osteoarthritis. The difference of severity grade between both groups was insignificant with a p-value of 0.548.

The mean WOMAC score before injection was 73.37±10.65, at one month it was 34.29±8.62, at 3 months 32.29±6.99 and at 6 months it was 33.71±8.84 in all patients. A detailed comparison of both groups with respect to WOMAC score is shown in Table 1. Data was stratified with respect to age, duration of symptoms, and severity grade of osteoarthritis as shown in Tables 2, 3, and 4 respectively.

*Table-1 Comparison of WOMAC score in both groups.*

| WOMAC Score | Group C (Mean±SD) | Group P (Mean±SD) | p-value |
|---|---|---|---|
| Pre-Injection | 71.54±12.18 | 75.20±8.58 | 0.086 |
| 1 month | 34.20±10.48 | 35.16±6.31 | 0.580 |
| 3 months | 33.20±8.13 | 31.38±5.58 | 0.195 |
| 6 months | 35.32±10.41 | 32.10±6.63 | 0.680 |

*Table-2 Stratification of WOMAC Score with Respect to Age*

| WOMAC Score | Age in Years | Group C | | Group P | | p-value |
|---|---|---|---|---|---|---|
| | | N | Mean±SD | N | Mean±SD | |
| **Pre-Injection** | 30 to 55 | 19 | 73.16±12.06 | 11 | 73.54±9.59 | 0.928 |
| | 56 to 70 | 31 | 70.55±12.34 | 39 | 75.59±8.35 | 0.043 |
| **1 month** | 30 to 55 | 19 | 32.42±6.91 | 11 | 34.73±5.76 | 0.359 |
| | 56 to 70 | 31 | 35.28±12.15 | 39 | 35.28±6.25 | 0.997 |
| **3 months** | 30 to 55 | 19 | 32.21±5.91 | 11 | 31±6.14 | 0.599 |
| | 56 to 70 | 31 | 33.81±9.28 | 39 | 31.49±5.49 | 0.167 |
| **6 months** | 30 to 55 | 19 | 36.11±9.31 | 11 | 34±6.78 | 0.518 |
| | 56 to 70 | 31 | 34.84±11.16 | 39 | 31.56±6.57 | 0.131 |

*Table-3 Stratification of WOMAC Score with Respect to Duration of Symptoms*

| WOMAC Score | Duration of symptoms (Months) | Group C | | Group P | | p-value |
|---|---|---|---|---|---|---|
| | | N | Mean±SD | N | Mean±SD | |
| Pre-Injection | ≤12 | 31 | 71.06±11.15 | 37 | 75.08±8.9 | 0.103 |
| | >12 | 19 | 72.32±13.99 | 13 | 75.54±7.93 | 0.459 |
| 1 month | ≤12 | 31 | 34±11.05 | 37 | 34.62±6.69 | 0.776 |
| | >12 | 19 | 34.53±9.77 | 13 | 36.69±4.99 | 0.469 |
| 3 months | ≤12 | 31 | 32.22±8.67 | 37 | 31.78±5.81 | 0.803 |
| | >12 | 19 | 34.79±7.07 | 13 | 30.23±4.88 | 0.053 |
| 6 months | ≤12 | 31 | 34.32±11.01 | 37 | 37.41±6.71 | 0.381 |
| | >12 | 19 | 36.95±9.41 | 13 | 31.23±6.56 | 0.068 |

*Table-4 Stratification of WOMAC Score with Respect to Severity of Osteoarthritis*

| WOMAC Score | Severity of Osteoarthritis | Group C | | Group P | | p-value |
|---|---|---|---|---|---|---|
| | | N | Mean±SD | N | Mean±SD | |
| Pre-Injection | Grade 2 | 21 | 74.19±12.04 | 15 | 74.8±8.05 | 0.866 |
| | Grade 3 | 29 | 69.62±12.13 | 35 | 75.37±8.91 | 0.039 |
| 1 month | Grade 2 | 21 | 34.57±7.28 | 15 | 33.87±6.29 | 0.704 |
| | Grade 3 | 29 | 33.93±12.42 | 35 | 35.71±6.33 | 0.461 |
| 3 months | Grade 2 | 21 | 33.29±7.46 | 15 | 29.67±5.41 | 0.119 |
| | Grade 3 | 29 | 33.14±8.71 | 35 | 32.11±5.57 | 0.571 |
| 6 months | Grade 2 | 21 | 35.71±7.64 | 15 | 31.87±7.13 | 0.135 |
| | Grade 3 | 29 | 35.03±12.16 | 35 | 32.2±6.51 | 0.239 |

## Discussion

Osteoarthritis is the most common type of arthritis. It is a debilitating disease that can significantly reduce the quality of life if not managed well [12]. Management is challenging and often the desired level of results is not achieved. Newer treatment modalities like intra-articular injections seem to work better than conventional strategies. The use of Prednisolone acetate and PRP is well documented [13-14].

In our study, we selected patients with severity grades 2 and 3 only on the basis of radiological findings. Patients with grades 2 and 3 had comparable WAMAC scores with mean scores between 72 t0 74. These findings were consistent with figures from a study conducted by Roos EM et al [15]

In our study, we found out that both intra-articular injections were equally effective and WOMAC scores were comparable at 1, 3, and 6 months as shown in Table 1. Huang Y et al in their study found out that both injections had short-term efficacy, but PRP was superior to prednisolone acetate in long-term efficacy [16].

Forogh B et al in their study found that single PRP injection results in more long-term pain reduction as compared to corticosteroids [17]. In another study conducted by Migliorini F et al., the results were different from the results of our study. Their study revealed that PRP injection had a better outcome in comparison to prednisolone, placebo, and hyaluronic acid [18].

A local study was conducted by Sohail A et al at CMH Peshawar, comparing the efficacy of intra-articular

steroids versus PRP. They concluded in their study that PRP is superior to steroids in terms of pain relief [19].

## Conclusion

It is concluded in our study that intra-articular injections of prednisolone acetate and PRP are equally effective in patients of moderate knee osteoarthritis.

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