

## Role of Platelet Rich Plasma (PRP) in Osteoarthritis Knee

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### Abstract

**Introduction:** Osteoarthritis of knee is a common condition affecting quality of life after the age of 40 years. Besides conservative measures of exercises and drugs, intra-articular injections of steroid and hyaluronic acid have been used for symptomatic relief. Autologous Platelet rich plasma (PRP) is being used recently with promising results.

**Material and Methods:** 50 patients of primary osteoarthritis knee more than 40 years were given single injection of 2ml of concentrated autologous PRP in the affected knee joint. They were followed at 1, 3 and 6 months. VAS and WOMAC scores were used for assessment of pain relief and functional status including quality of life.

**Results:** All the patients showed statistically significant progressive decline in both the scores. WOMAC score decreased from baseline 59 to 51.96 at 1 month, 48.8 at 3 months and 43.62 at 6 months (p value=0.0001). VAS score decreased from 6.26 at baseline to 5.18 at 1 month, 4.66 at 3 months to 4.18 at 6 months (p=0.0001).

**Conclusion:** Single injection of autologous PRP is effective in reducing pain and improving quality of life progressively for 6 months.

**Keywords:** Osteoarthritis, Knee, PRP, Platelet rich plasma.

### Introduction

Osteoarthritis knee is a degenerative disorder of multifactorial etiology, characterized by loss of articular cartilage, hypertrophy of bones at the margins making osteophytes, subchondral sclerosis and various alterations in synovial membrane and joint capsule. The impact of osteoarthritis is gradually increasing because of the continued increase in mean age of the population. With treatment being variably effective it still remains a challenging problem worldwide. The regeneration capacity of cartilage is limited because of its isolation from systemic regulation and lack of vessels and nerve supply. Osteoarthritis has been classified on the basis of radiological features by Kellgren-Lawrence in four grades.<sup>(1)</sup> Grade I and II disease have minimum radiological features. Grade III has definite radiological findings and Grade IV is advanced arthritis. Intra-articular injections of steroids and hyaluronic acid have been used with improvement for variable period. Intra-articular Platelet rich plasma injection is a simple, low cost and minimally invasive method that allows one to obtain from the blood, a natural concentrate of autologous growth factors, which might help in cartilage regeneration and alteration of pathological process of osteoarthritis knee. This study aims to find out the efficacy of single intra-articular injection of platelet rich plasma in osteoarthritis knee.

### Material and Method

This prospective study was done at Department of Orthopedics and attached tertiary care hospital from September 2015 to June 2017. A total of 50 patients were included for intra-articular injections of autologous PRP. The patients selected were above 40 years of age with

unilateral knee involvement with primary osteoarthritis of knee grading 2,3 or 4 by Kellgren- Lawrence grading system. All the patients were subjected to detailed history regarding their pain, and limitation of day to day activities. Pain was assessed using Visual Analog Scale (VAS) score, taking 10 as the maximum pain and zero as no pain. Western Ontario and McMaster University (WOMAC) score/index was used to assess functional status. This index uses 24 parameters regarding pain, stiffness, and physical function in osteoarthritis of knee. Each parameter is given score ranging from 0 to 4 depending on the increasing difficulty in doing the activity. Thus higher score shows worse condition than in lower score. It is used to monitor the course of disease or to determine the effectiveness of treatment in improving the functional outcome of the patient undergoing treatment as compared to the baseline /pretreatment values.

All the patients were subjected to x ray knee AP in standing and lateral view. Written informed consent was taken from patients. PRP was prepared in a standard protocol as follows: 20 ml blood was drawn from antecubital vein and divided into 4 test tubes of 5 ml capacity, containing CPDA anticoagulant solution. All the test tubes were placed in the centrifuge and were counterbalanced. The first centrifuge cycle was done at 1480 RPM for 6 minutes. This resulted in separation of whole blood into a lower red blood cell region and upper straw colored plasma. The upper plasma was aspirated from all the four tubes and taken into new test tubes. The tubes with the straw colored plasma were again centrifuged at 3400 RPM for 15 minutes. Now the tube contains upper layer of serum containing fibrinogen and low concentration of platelets. The bottom layer has red

tinged serum consisting of highly concentrated platelets and is used as platelet rich plasma. On an average 3 to 4 ml. of concentrated PRP is available after final centrifugation.

PRP was infiltrated in the suprapatellar pouch from the lateral aspect of knee under all aseptic precautions after painting and draping the knee area. The needle is inserted at about 45 degree of angle from superolateral area towards medial joint line of knee. Approximately 2 ml of PRP is infiltrated into the joint after ensuring entry of the needle into the joint. The patient is encouraged to flex and extend the knee after injection to distribute PRP uniformly into the joint. Post injection the patient is observed for one hour. All the patient were given paracetamol 650mg stat dose and SOS after that. Follow up was done at 1 month, 3 months and 6 months. Observations were analyzed based on VAS score for pain and functional assessment using WOMAC score.

### Observation and Results

A total of 50 patients with mean age 59.6 years, age range from 40 to 76 years were studied. The maximum patients (62%) were in the age range 50 to 70 years. There were 19 males and 31 females, suggesting female predominance in osteoarthritis knee. Left knee was involved in 29 (58%) and right knee in 21(42%). 50% cases were having grade III osteoarthritis. Grade II and grade IV osteoarthritis were seen in 30% and 20% cases respectively. Using Student's paired t test comparison of WOMAC score shows good results after single intra-articular injection of PRP. Mean pre- treatment score of 59.00 declined to 51.96 at one month, 48.08 at three months and 43.62 at six months. This shows continuous improvement and values are statistically significant considering p value as 0.0001. Using VAS score for comparison of pain the pretreatment mean value of 6.26 declined to 5.18 at one month, 4.66 at three months and 4.18 at 6 months. The continuous decline shows PRP to be effective in reducing pain. Thus using both the WOMAC and VAS scale a continuous and statistically significant improvement is seen in pain and functional status of knee at 1,3 and 6 months after single intra articular injection of autologous PRP.

### Discussion

Articular cartilage lesions and degenerations are difficult to treat and present a challenge for orthopedic surgeons because of poor blood supply and inherent low healing potential.<sup>(2,3,4)</sup> Intra-articular steroids have been used by various authors but later on it was found that it provides a relief for one month period only.<sup>(5)</sup> Intra-articular PRP injection has been found to provide long term relief.<sup>(5)</sup>

Till date no proven disease modifying therapy is available which can completely halt the process of degeneration of cartilage. Autologous blood products providing cellular and humoral mediators favoring tissue healing have been used in a variety of conditions.<sup>(6,7)</sup> The

rationale is based on activity of growth factors carried in blood. The fact that platelet secrete growth factors and active metabolites means that its use can have a positive influence in clinical situations involving tissue with a low healing potential such as cartilage. Gaissmaier et al<sup>(8)</sup> investigated the effect of human platelet supernatant on chondrocytes in human articular biopsy specimens and observed an acceleration of chondrocyte expansion. Mishra et al<sup>(9)</sup> described PRP enhanced mesenchymal stem cells proliferation and chondrogenic differentiation in vitro. This might justify its use in osteoarthritis knee in view of cartilage repair. Kon et al<sup>(10)</sup> evaluated the effectiveness of PRP in osteoarthritis and showed sustained efficacy. Forogh B et al<sup>(11)</sup> used intra-articular PRP in advanced osteoarthritis for subjective pain relief one month after intra-articular steroid injections. Sampson et al<sup>(12)</sup> used 3 PRP injections at one month interval in 14 patients with primary or secondary osteoarthritis. They demonstrated improvement although statistically not significant in the cartilage thickness on sonography during first six months follow up. Egemen Ayhan et al<sup>(5)</sup> in their study of intra-articular injections of corticosteroid, hyaluronic acid, or PRP for knee osteoarthritis mentioned PRP to be safe and promising option for treatment of OA knee.

### Conclusion

Single injection of autologous Platelet rich plasma is found to significantly reduce pain and improve functional status of knee and thereby quality of life as judged by continuously decreasing VAS score and WOMAC score at 1 month, 3 months and 6 months in cases of primary osteoarthritis of knee.

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