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Original Research Article

Functional outcome of intra articular platelet rich plasma injections in early osteoarthrosis knee

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ABSTRACT

Background: The effectiveness of platelet-rich plasma (PRP) injections for osteoarthrosis (OA) is still controversial. We investigated the effect of PRP injections in patients with knee osteoarthrosis based on decreasing pain, improving function.

Purpose: To assess the outcome of intra-articular platelet-rich plasma (PRP) injections into the knee in patients with early stages of osteoarthrosis (OA).

Materials and Methods: This is a prospective study in which 50 knees were followed up for a minimum of 6 months. Two intra articular injections were injected at one month interval. The outcome was assessed using WOMAC and Visual Analogue Scale (VAS) recorded prior to injection and then at 1, 3 and 6 months after second injection.

Results: There was a significant improvement in all scores over time compared to the pre-treatment value ($p < 0.001$). The mean baseline VAS was 7.48, which was found to be significantly reduced at the end of follow upto 3.6 (48.1% reduction in pain).

Mean total WOMAC score initially at baseline was found to be with 79.58. There was reduction in the WOMAC score during follow up. The WOMAC score at the end of the study was 37.66 with significant reduction. From the third month of follow up, there was significant improvement of VAS score and WOMAC score (VAS score - p value was less than 0.001, WOMAC- p value was 0.0001).

Conclusions: On the basis of the current evidence, PRP injections reduced pain more effectively than did placebo injections in osteoarthrosis of the knee. Additionally, function improved significantly more with PRP injections. We need large randamized multi centric study to test whether PRP injections should be a routine part of management of patients with osteoarthrosis of the knee.

1. Introduction

Osteoarthrosis (OA) of knee is an idiopathic, progressively debilitating chronic degenerative disease of joint. Osteoarthrosis of knee is common and it's in rise due to lifestyle modification in modern era.[1–3] Individuals affected with osteoarthrosis clinically presents with deep aching joint pain, joint swelling, and reduced joint range of motion and crepitus of joint. Weight bearing antero-posterior and lateral radiograph may show narrowing of joint space, osteophyte formation, subchondral cyst and sclerosis.[4]

Treatment options range from conservative method including physiotherapy and pharmacotherapy to surgical procedures including arthroscopic debridement, osteotomy and knee arthroplasty. Despite large options available, there is no standard or curative treatment till date.[5]

Intra articular PRP acts by limiting damage and promote healing mechanisms of cartilage involved. It acts by its anti-inflammatory, anabolic and localmilieu altering mechanism through release of growth factor present in the platelets.[6] It will increase the cartilage to repair itself, hence autologous preparations are very uself in treating degenerative conditions.

This prospective clinical trial was designed in an attempt to demonstrate its efficacy (if any) and functional outcome

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in early stages of knee osteoarthrosis, considering the vast role of platelet derived growth factors.

2. Materials and Methods

All patients attending the Dept. of Orthopaedics OPD, 40 to 70 years age group with knee pain included according to the inclusion and exclusion criteria during the study period (Jan 2015 to Sep 2016).

2.1. Inclusion criteria

1. Both male & female patient of age between 40 and 70 years.
2. Body mass Index (BMI) <30.
3. Normal complete blood count (CBC) and coagulation control.
4. Patients with symptomatic osteoarthrosis of knees (Kellgren Lawrence scale grade 1-2 based on Radiographic findings).
5. Patients with no symptomatic relief with analgesics and physiotherapy.
6. Patients who gave consent for treatment with PRP as per our protocol.
7. Minimum follow up of 6 months.

2.2. Exclusion criteria

1. Age less than 40 and over 70 years.
2. History of presence of neoplasm, any infection or active wound over the knee.
3. Secondary osteoarthrosis.
4. Autoimmune and platelet disorders.
5. History of intra articular steroid injections to knee.
6. Kellgren – Lawrence scale grade 3 and 4 based on radiographic findings.

2.3. Sample size

The sample size is 50 knees. A detailed clinical history of the patient was elicited. A general physical examination and Local examination of the affected knee was done and basic investigations done. Plain antero posterior and lateral weight bearing radiograph of bilateral knee was taken. On the basis of the radiographs kellegrans Lawrence grading was done.

2.4. Prp preparation

Under all aseptic precautions, about 20 ml of blood was extracted from the antecubital vein for single knee. In case of both knees, about 40 ml of blood was extracted. Extracted blood was collected in a sterile sodium citrate coated vial. With no delay, the blood was centrifuged at the rate of 1500 rpm for 15 minutes, twice on a table top centrifuge at blood bank, department of transfusion medicine, MGMCRI and the blood will be separated into PRP and residual red blood cells with the buffy coat. 5-6 ml of PRP from the centrifuged blood was separated.

2.5. Injection technique

Patient in supine position. Respective knee painted and drapped. A 18 gauge needle was inserted in the superolateral aspect of the knee joint into the suprapatellar pouch. With a sterile syringe, joint effusion, if any was aspirated. 5 ml PRP were injected into the joint. Sterile dressing was applied at the injection site. Knee was mobilized for few times after injection and compression bandage was applied.

2.6. Post injection protocol

Patients were allowed to weight bear after 24 hours. A strict vigilance was done in view of adverse reactions such as pain following injection, joint swelling or any systemic reaction. If patient experiences pain, ice pack application given, if not subsided opioid analgesics were given for pain. Patients were asked to come for second injection at 4 weeks interval. Patients were followed at 1^{st}, 3^{rd} and 6^{th} month following the second injection. During every follow up visit, the following outcomes were noted. VAS score and WOMAC score on the day of follow up visit. Adverse reactions if any.

3. Results

A total number of 50 Knees were followed up at 1^{st} month, 3^{rd} month, 6^{th} month. No patients were lost in follow up. The efficacy was compared in respect to age, sex, body mass index and the grades of osteoarthrosis in the study. The study shows that the majority of patients were between 51-60 years old (56%). It shows that the majority of patients were females (70%) and males were only (30%).

There was a significant improvement in all scores over time compared to the pre-treatment value ($p < 0.001$). The mean baseline VAS was 7.48, which was found to be significantly reduced at the end of follow upto 3.6 (48.1% reduction in pain).

Mean total WOMAC score initially at baseline was found to be with 79.58. There was reduction in the WOMAC score during follow up. The WOMAC score at the end of the study was 37.66 with significant reduction. From the third month of follow up, there was significant improvement of VAS score and WOMAC score (VAS score - p value was less than 0.001, WOMAC- p value was 0.0001).

4. Discussion

Osteoarthrosis, the most common form of degenerative arthroses, affects the elderly resulting in physical, mental

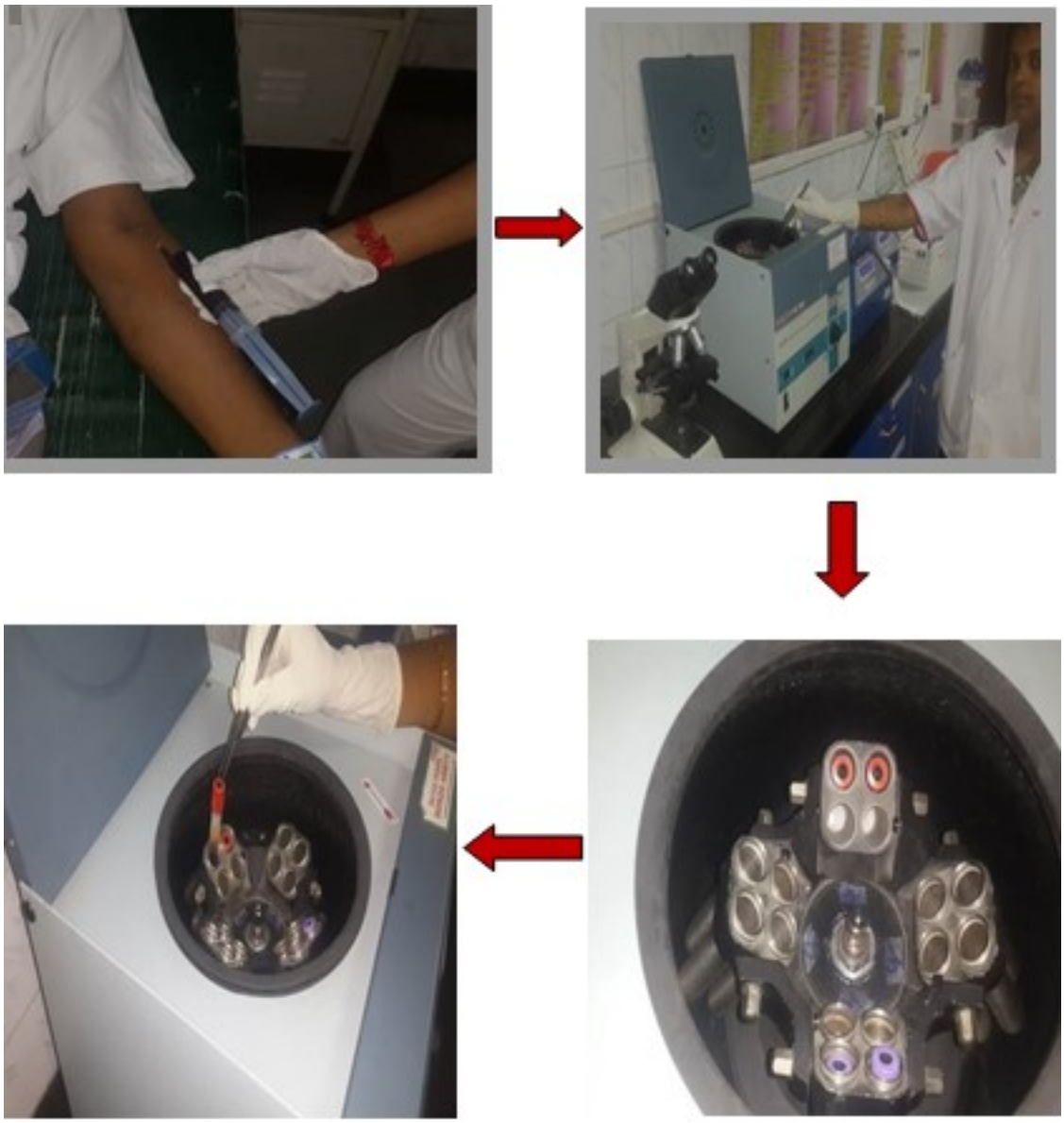

Fig. 1:

Table 1: Visual analogue score

Visual Analogue Score	Mean	SD	H Value	P Value
Before PRP injection	7.48	0.788	152.72	<0.0001*
At 1st Month follow up	5.22	0.615		
At 3rd Month follow up	3.76	0.624		
At 6th Month follow up	3.6	1.01		

*- Significant (Kruskal-Wallis Test)

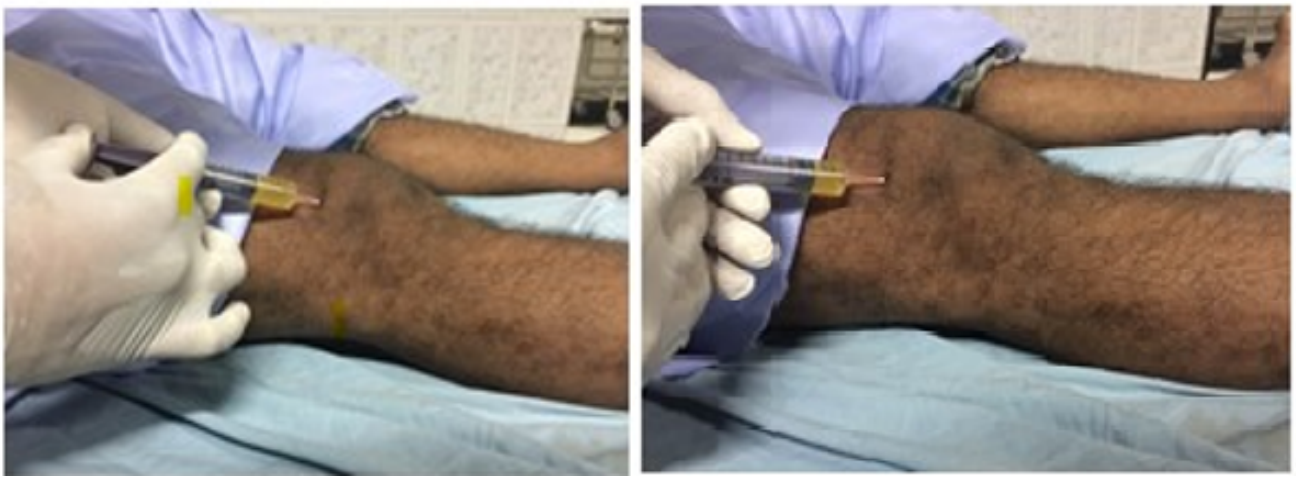

Fig. 2:

Table 2: Comparisonof groups by baseline characteristics

Baseline Characteristics	
Mean Age	54.66±7.05
Sex	
Male	15
Female	35
Mean Height	157.63±7.92
Mean Weight	60.33±7.373
Mean BMI	24.04±3.358
WOMAC SCORE	
Mean Pain	17.04±0.856
Mean Stiffness	5.98±0.82
Mean Physical Function	56.56±4.87
Mean Total WOMAC	79.58±5.41
Mean VAS	7.48±0.788

and social distress. Osteoarthrosis most commonly affects the knee and is more common in elderly women.

Many treatment options were used in the past with the goal of decreasing pain and improve the joint function. They included physiotherapy, life style modifications such as weight reduction and activity modifications and pharmacological therapy such as oral NSAIDs, Opioids, glucosamine and chondroitin supplementation and intra articular injections of steroids and hyaluronic acid. Surgical options included arthroscopic lavage, debridement in cases of loose bodies, osteotomies and total knee replacement which is the last option in whom all medical management have failed and patients strive with intractable pain and disability.

Intra articular injectables include corticosteroids, hyaluronic acid viscosupplementation and autologous platelet rich plasma. Intra articular autologous Platelet rich plasma is a substrate rich in growth factors, a promising agent for cartilage healing in osteoarthrosis of knee, had also disease limiting activities and reduce pain in patients with osteoarthrosis of knee.

Physicians, now are increasingly concentrating in treatment modalities that also reverse disease process and repair damaged tissues. Options available was the intra articular autologous platelet rich plasma injection, which is recent and have more striking relief in patients.

Keeping this in mind, we decided to do this study to find the efficacy of autologous intra-articular platelet rich plasma injection in osteoarthrosis knees and its functional outcome in early osteoarthrosis knee patients.

With regards to usage of PRP, we inject the freshly prepared 5-6 ml PRP at 4 weeks interval. Each time we prepared fresh PRP by drawing blood, unlike cold storing the PRP obtained at 1^{st} injection as done by Kon et al., as ours was an open system and we had doubts about platelet function due to cold storage but different authors used various plans of PRP injection. Filardo et al. used 2 injections of 5 ml volume at 4 weeks interval.[7] Cerza et al. used 4 injections at 1 week interval of volume 5.5 ml.[8] Kon et al. used 3 injections at 2 week intervals of volume 5

ml.[9] Spakova et al. used 3 injections at 1 week interval with volume of 3 ml.[10]

The mean age in our study was 54.66 years and it is similar with other studies.

The PRP prepared and used in this study had platelets amplified with an average of 4.07 times that of the baseline count. Aseptic precautions were followed in each and every step of the PRP preparation process. Spakova et al, in their study, had an average of 4.5 times amplification of platelet count.[10]

In our study the mean baseline VAS was 7.48 and it was gradually reducing during follow up. The mean VAS score at 1^{st} month follow up was 5.22 and 3^{rd} month follow up was 3.76 and was found to be significantly reduced at the 6^{th} month follow upto 3.6. In the study by Gobbi et al, patients had a baseline VAS of 4.1 ± 0.7, at 6 month follow up was 2.2 ± 0.4 and at 12^{th} month follow up was 1.2 ± 0.3. The mean baseline Pain score in our study was 17.04 which was drastically reduced at follow up to 8.54. Mean Stiffness score at baseline was 5.98 and it significantly reduced at 6 months to 2.18. The mean physical function score at baseline was 56.56 with significant reduction of score of 26.94 at 6 months.

In our study the mean WOMAC score initially at baseline was with 79.58. There was reduction in the WOMAC score during follow up. The WOMAC score at the 6^{th} month of follow up was 37.66 which is a significant reduction. This is consistent with the study by Cerza et al, the pre-treatment WOMAC in PRP group who received 4 injections was 79.6 and at 4,12,24 month follow up was 49.6, 39.1 and 35.6 respectively. Patel et al.[11] in his study among three groups, Group A (52 knees) received a single injection of PRP, group B (50 knees) received 2 injections of PRP at 3 weeks interval, and group C (46 knees) received a single injection of normal saline, showed an improvement in the group who received 2 injections of PRP at 3 weeks interval (mean WOMAC score of 53.20; mean WOMAC scores at final follow-up of 6 months was 30.48). The mean WOMAC scores worsened from baseline (9.04, 2.70, 33.80, and 45.54, respectively) to last follow-up (10.87, 2.76, 39.46, and 53.09, respectively) in group C. The 3 groups were compared with each other, and no improvement was noted in group C as compared with groups A and B. There was no difference between groups A and B, and there was no influence of age, sex, weight, or body mass index on the outcome

In our study from the third month follow up, there was a significant reduction of VAS score and WOMAC score (VAS score - p value was less than 0.001, WOMAC- p value was 0.0001).

In age wise comparison, individuals were divided into three clusters in our study Cluster one 40-50 years, cluster two 51-60 years and cluster three 61-70 years. VAS and WOMAC index shows a decreasing trend in all three clusters. However cluster one & two showed a significant decrease than cluster three at the end of the study. i.e 6^{th} month follow up.

In our study both males and females showed similar trend of decreasing VAS and WOMAC score from mean baseline to 6^{th} month follow up. There was no correlation of mean pain scores and other WOMAC scores with respect to age, sex or BMI in our study and WOMAC scores decreased equally with respect to all parameters. Similarly Patel et al.,[11] concluded in their study that there was no influence of age, sex, weight, or body mass index on the outcome. Kon et al[8] however noticed good response in young males and low BMI individual but their study had more males than our study and the Sanchez et al. study. In our study, the BMI didn't have any influence of the outcome, as both groups showed statistically significant decreasing trends of VAS and WOMAC score from mean baseline to mean 6^{th}month follow up. The mean BMI of our study group and of Kon et al. were similar (25 ± 3) and both the studies had fewer number of overweight individuals.

In our study both grade I as well as grade II showed significant better outcome with PRP injections, VAS and WOMAC score markedly decreased from mean baseline to 6^{th} month follow up in both the grades. Filardo et al., in their study found that PRP had a better outcome in grade I and II compared to grade III and IV.[7]

In our study there was no complications except moderate pain in 28 knees with lasted maximum upto 8 days in few cases. Similarly Kon et al. mentioned about local minor adverse events like mild pain and effusion in some cases (exact number not mentioned) and none persisted more than 2 days except for 1 case which spontaneously resolved after two weeks. The complications in our study were probably due to the stimulation of the body's natural response to inflammatory mediators.

5. Conclusion

Intra-articular injection of PRP is effective in treating early grade I and II osteoarthrosis knee. The study shows outcome with significant improvement of symptoms in patients with age group between 40 and 60. Our study group didn't required analgesics following 1 week after injections till follow up of 6 months Complications like infection, stiffness and effusions is nil in this study. Unlike steroids it doesn't increases the risk of infection in future procedures. This is a minimally invasive procedure with better outcome improving the quality of life in patients which gives symptomatic pain relief and delays the need for surgical intervention

5.1. The limitations of this study are

Smaller sample size. All grades of Osteoarthrosis were not included, for generalization of outcome. Our study's

follow up duration of 6 months is not enough. However we are following the patients and looking forward to re-evaluate them at 12 months, 18 months and 24 months. We evaluated only clinical parameters by using WOMAC and VAS scoring system. Radiographic follow up by MRI, maybe considered to evaluate the cartilage regeneration (if any) in subsequent research efforts; we could not do this due to the cost and ethical issues. We did not evaluate for the contained growth factors in our PRP product.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. Chopra A, Patil J, Bilampelly V. The Bhigwan (India) COPCORD: Methodology and first information report APLAR. *J Rheumatol*. 1997;1:145–54.
2. Chopra A, Patil J, Bilampelly V, Relwane J, Tandle HS. Prevalence of rheumatic disease in rural population in Western India: A WHO-ILAR-COPCORD study. *J Assoc Physicians India*. 2001;49:240–6.
3. Mahajan A, Jasrotia DS, Manhas AS, Jamwal SS. Prevalence of major rheumatic disorders in Jammu. *JK Sci*. 2003;5:63–6.
4. Heidari B. Knee osteoarthritis prevalence, risk factors, pathogenesis and features. *Caspian J Intern Med*. 2011;2(2):205–12.
5. Anandacoomarasamy A, March L. Current evidence for osteoarthritis treatments. *Ther Adv Musculoskel Dis*. 2010;2(1):17–28.
6. Zhang J, Wang JH. Platelet-Rich Plasma Releasate Promotes Differentiation of Tendon Stem Cells Into Active Tenocytes. *Am J Sports Med*. 2010;38:2477.
7. Filardo G, Kon E, Martino AD. Berardo Di Matteo2, Maria Letizia Merli2, Annarita Cenacchi3, Pier Maria Fornasari3 and Maurilio Marcacci2, Platelet-rich plasma vs hyaluronic acid to treat knee degenerative pathology: study design and preliminary results of a randomized controlled trial. *BMC Musculoskel Disord*. 2012;13:229.
8. Cerza F, Carnì S, Carcangiu A, Vavo ID, Schiavilla V, Pecora A, et al. Comparison Between Hyaluronic Acid and Platelet-Rich Plasma, Intra-articular Infiltration in the Treatment of Gonarthrosis. *Am J Sports Med*. 2012;40(12):2822–7.
9. Kon E, Buda R, Filardo G, Martino AD, Timoncini A, Cenacchi A. Platelet-rich plasma: intra-articular knee injections produced favorable results on degenerative cartilage lesions. *Knee Surg Sports Traumatol Arthrosc*. 2010;18(4):472–9.
10. Spaková T, Rosocha J, Lacko M, Harvanová D, Gharaibeh A. Treatment of Knee Joint Osteoarthritis with Autologous Platelet-Rich Plasma in Comparison with Hyaluronic Acid. *Am J Phys Med Rehabil*. 2012;91(5):411–7.
11. Patel S, Dhillon MS, Aggarwal S, Marwaha N, Jain A. Treatment With Platelet-Rich Plasma Is More Effective Than Placebo for Knee Osteoarthritis. *Am J Sports Med*. 2013;41(2):356–64.

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