

Efficacy and outcome of platelet rich plasma in management of primary osteoarthritis Knee; A prospective study

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Abstract

Introduction: The present management line of osteoarthritis of knee is mostly symptomatic, therefore the need to investigate treatment modality which addresses the disease process in itself. This study was undertaken with an aim to evaluate the efficacy of platelet rich plasma in primary osteoarthritis of knee.

Materials and Methods: This prospective study was done on 67 knees in 60 patients of early primary osteoarthritis of the knee. Three injections of platelet rich plasma were given at four weeks interval and the outcome was evaluated using WOMAC and VAS score at pre injection, 3 weeks, 12 weeks and 24 weeks. Ahlback's grading was done at pre-injection and at 6 months.

Results: Most of the cases in our series were in the age group of 51-60 years with female predominance (66.7%), 46 cases had grade 2 disease and the remaining had grade 1 involvement. Improvement in WOMAC score parameters started at 3 weeks with progressive improvement at subsequent follow-ups. WOMAC score parameters (pain, stiffness, physical function and total score) at pre injection were 14.31, 5.01, 36.52 and 55.75 and at 6 months follow up were 6.54, 2.03, 19.07 and 27.66 respectively. Similar improvement was seen in VAS score with pre injection score of 6.45 and final score of 3.76. The average WOMAC score was less for grade 1 as compared to grade 2 (45.52 and 60.41). Improvement was seen in 89.55% of cases though the level varied from good to mild improvement. There was no complication related to the treatment in our series.

Conclusion: The initial results conclude that PRP is an effective treatment modality in early grades of primary Osteoarthritis of knee. However, further high evidence studies are required to look for the long-term effects and to confirm the findings of this study.

Keywords: Platelet rich plasma, osteoarthritis, intra articular injection, PRP in knee.

Introduction

Osteoarthritis (OA) is the most predominant form of arthritis and the main cause of disability in the people aged 65 and older.¹ It is a clinically varied and poorly understood disease. Although most research has looked at destruction of the cartilage, arthritis is often now considered in terms of organ failure.² The available management strategies at present mostly provide symptomatic relief but do not in general, address the disease process itself. The role of growth factors and autologous platelet rich plasma (PRP) is recently being considered as a therapeutic possibility to augment healing of chondral injuries and modify the course of early degenerative arthritis. The concept that application of PRP would improve cartilage repair is based on the physiological role of platelets in wound healing. There are over 1500 proteins within platelets including the growth factors like PDGF, VEGF, TGF-beta, FGF, and EGF that are known to play a pivotal role in the normal healing process.³

The apposite treatment for cartilage injury remains a clinical challenge despite advances in surgical procedures and techniques. Even after promising preclinical findings and huge interest in its clinical application most questions on PRP still remains unanswered.

Materials and Methods

This prospective study was conducted in a tertiary care centre of northern India on 60 patients of primary early OA diagnosed by American College of Rheumatology Criteria⁴ after obtaining an informed written consent and staged as

per Ahlback's radiological grading⁵. Bilateral knee involvement was seen in seven patients making the final figure of 67 knees. The patients with Grade 1 and Grade 2 disease, aged 35-70 years and no history of any intra-articular injection in previous 3 months were included in the study. The platelet rich plasma was prepared from 100 ml patient's venous blood collected in 100 ml bag with CPD-A (Citrate Phosphate Dextrose and Adenine) as anticoagulant. The blood was transferred into two 50 ml tubes which were then centrifuged for 15 minutes at 1500 rpm on a table top centrifuge. The blood was separated into platelet rich plasma (PRP) and residual RBC's with the buffy coat. The PRP was extracted through a pipette and transferred to a test tube. It was then supplied in a syringe in a quantity of 8 ml meant for injection into one knee. The platelet concentrate was injected by lateral approach by 18-20 Gauge needle. Patients were given a total of three injections at four weeks interval. Pre-injection and post injection evaluation at three weeks, three months and six months was done using VAS⁶ and WOMAC⁷ score. Ahlback's grading wherever possible was done at six months.

Results

There were total 60 patients, of which 40 (66.7%) were females and 20 (33.3%) were males. Majority of the patients were in the age group of 51-60 years constituting 41.7%. 46 knees revealed grade 2 disease whereas grade 1 disease was seen in 21 knees. The age and sex distribution of patients is given in the table 1.

Table 1: Age and sex distribution of patients.

Age (in years)	Females	Males	Total
<40	6		6 (10.0%)
41-50	12	5	17 (28.3%)
51-60	15	10	25 (41.7%)
61-70	7	5	12 (20.0)
Total	40	20	60 (100%)

Individual mean WOMAC score and total mean WOMAC score were analyzed. Improvement in symptoms started showing up at 3 weeks which gradually improved over subsequent follow ups as depicted by p value of 0.000 and decrease in the mean values as shown in table 2.

VAS score decreased from 6.45 at pre injection to 6.22, 4.54, and 3.76 at subsequent follow ups till 6 months. The improvement seen was statistically significant (p value 0.000). (Table 3).

The mean Total WOMAC score based on Ahlback's grading done at pre injection and third follow up was calculated and it was observed that mean Total WOMAC score was less for grade 1 in comparison to grade 2 osteoarthritis. Twenty-one patients had mild pain and 2 patients had moderate pain which subsided in 2-3 days without any intervention. One patient experienced episode of sweating and tachycardia. No serious complication was encountered. Improvement as per patient version was asked at the end of six months. Sixty patients comprising 89.55% showed improvement though the level varied from mild to good improvement. (Table 4).

Discussion

In the current literature only a handful studies have studied the use of PRP in primary osteoarthritis of knee. However, there is lack of standardization among the available data. As a result, the evidence to support the clinical use of PRP as a treatment modality is uncertain in primary osteoarthritis of knee. The mean age of patients in our study was 53.75 with a range of 35-70 years. Similar results were observed by Filardo et al⁸ and Patel et al,⁹ whereas, in a study by Sanchez et al¹⁰ the mean age of the patients was 63.53 years which was because of inclusion of advanced cases of osteoarthritis in their study.

We noted a female predominance in our study which is in agreement with the other studies.^{7,8} However, in contrast, Kon et al¹¹ and Sampson et al¹² observed male preponderance in their study.

We experienced a definite correlation with Ahlback's grading. Total WOMAC score was less for grade 1 in contrast to grade 2 at baseline as well as at third follow up. Kon et al¹¹ concluded that younger patients with lower degree of degenerative chondropathy attained better results

in comparison to patients affected by early osteoarthritis, which in turn showed higher improvement in comparison to patients of advanced osteoarthritis. Patel et al⁹ also obtained a similar correlation with Ahlback's grading in both A and B, with grade 1 knees having lower mean pain and other WOMAC scores than grade 2 knees (P =0.016 for group A, P = 0.005 for group B).

Pain being the most troublesome symptom, WOMAC and VAS score assessment revealed alike trends. Pain decreased significantly at first follow up which was comparable to the other published literature. However, the analysis of published data showed worsening at final 6 months follow up, which raises a question if the effect of PRP is provisional or it has the ability to modify the disease process or serial injections are required for long term relief? This is still an unanswered question and future research work is required to prove the same.

Sanchez et al¹⁰ in his study observed 33.3% success rate at week 5, Kon et al¹¹ reported 80% satisfied patients and Patel et al⁹ had 67.3% satisfied patients in group A and 64% satisfied patients in group B at 6 month follow-up, in comparison with the control group in which only 4.3% were satisfied. We reported 89.55% improvement though the level varied from good improvement to mild improvement.

None of the previous studies in literature has mentioned any serious side effects on administration of platelet rich plasma. Same results were validated in our study. The main complication was mild pain which was probably due to an interventional procedure and natural response of body to inflammatory mediators.

We assume that platelet rich plasma possibly has a role in the treatment of osteoarthritis which is supported by the improvement seen in VAS and WOMAC scores in our study at short term follow up. This improvement in our study is possibly due to the anti-inflammatory properties or due to release of various growth factors and not because of chondral remodeling. If chondral remodeling was the cause for the improvement of symptoms, the benefit would have started later and lasted for a longer duration, however to comment on the same in our study, longer follow up is needed. Furthermore, high value studies with longer follow up are required to evaluate, if the effect of PRP is temporary or it has the ability to modify the disease process.

Limitations in our study were time period and the evaluation parameters used which were WOMAC and VAS score only because of the fact that pain is the main presenting symptom. Another drawback was lack of evidence if there is any cartilage regeneration as there was no follow up investigations other than X-ray which is not a sensitive device to document the change if there is any.

Table 2: WOMAC score (mean) at pre-injection, 3 weeks, 3 months and 6 months interval

Parameters	Pre injection	First follow up	Second follow up	Third follow up
Pain	14.31±2.12	13.03±2.47	8.99±2.23	6.54±3.19
Stiffness	5.01±1.34	4.31±1.51	3.01±1.39	2.03±1.51
Physical function	36.52±8.79	35.03±9.06	23.82±9.92	19.07±8.46
Total	55.75±10.90	52.34±11.54	35.82±9.92	27.66±12.48

Table 3: VAS score means with time

VAS score	Mean \pm SD
Pre injection	6.45 \pm 1.22
1 st follow up	6.22 \pm 1.19
2 nd follow up	4.54 \pm 1.11
3 rd follow up	3.76 \pm 1.37

Table 4: Status of improvement in patients at six months

Number of knees (N=67)	Satisfaction
17 (25.4%)	Good improvement
23 (34.3%)	Moderate improvement
20 (29.9%)	Mild improvement
07 (10.4%)	No improvement
-	Worsened

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Conclusion

We conclude that PRP appears to be a good treatment option for early grades of primary osteoarthritis of knee at short term follow up. However, more high value evidence based studies are required to prove its effectiveness on longer follow up and in late stages of OA cases.

Conflict of Interest: None.

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