



Original Research Article

Role of platelet rich plasma in osteoarthritis of knee joint among south Indian population

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ABSTRACT

Aim: The purpose of this prospective study is to clinically evaluate the efficacy of treatment for knee osteoarthritis using platelets rich plasma injection.**Materials and Methods:** This study was performed between January 2018 and June 2018 at the Government Coimbatore Medical College and Hospital as a day care procedure. Eighty patients with knee osteoarthritis are treated with platelet-rich plasma and studied. Primary data collection was performed using questionnaire tool VAS and WOMAC.**Results:** All patients in this study completed a questionnaire on pre-injection, 8 weeks post-injection and 12 weeks follow up visits using the VAS and WOMAC score. After 3 months the VAS score was 1.8 ($p < 0.001$) and the WOMAC score improved from 78 to 32 ($p < 0.001$).**Conclusion:** This study suggests using platelet rich plasma in osteoarthritis of the knee joint as a cost effective and less complicated approach to relieve pain and improve day to day activities.© 2020 Published by Innovative Publication. This is an open access article under the CC BY-NC-ND license (<https://creativecommons.org/licenses/by/4.0/>)

1. Introduction

Osteoarthritis is the most common form of arthritis in knee in adults.¹ It is the clinical and pathological outcome of a range of disorders that results in structural and functional failure of the joint. It is a chronic disease involving the entire joint including subchondral bone, menisci, ligaments, periarticular muscles, joint capsule and synovium.²

Osteoarthritis is a slow progressive disease which leads to significant morbidity in later stages. The disease in its early stage requires continual treatment of pain so as to sustain day to day activities of the patient. Conservative lines of treatment, including non-steroidal anti-inflammatory drugs, physical therapy, stretching exercises, corticosteroid injections, and extracorporeal shockwave therapy regarded as the mainstay of treatment in the early stages of this disease³ for providing substantial pain relief.

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A new frontier in the treatment of orthopedic injuries is with the growing science of orthobiologics or the 'science of injectables' to promote healing through the use of the patient's own biological tissues. For 20 years, PRP has been utilized in a number of medical fields including orthopedics, sports medicine, neurosurgery, urology, and maxillofacial surgery. Platelets rich plasma is promoted as an ideal autologous biological blood-derived product, which can be exogenously applied to various tissues where it releases high concentrations of platelet derived growth factors that enhance wound healing, bone healing and tendon healing.⁴ The purpose of this prospective study is to clinically evaluate the efficacy of treatment for knee osteoarthritis using platelet-rich plasma injection.

2. Materials and Methods

This study was performed between January 2018 and June 2018 in Government Coimbatore Medical College

and Hospital as a day care procedure. Eighty patients with knee osteoarthritis (including early and advanced disease condition) were treated with platelet rich plasma and studied. Staging was done using Kellgren-Lawrence method. The principle objective of the current study is to define the improvement in intensity of pain in patients with knee osteoarthritis treated with PRP injection at 8 weeks and 12 weeks as measured by Visual analogue scale for pain (VAS) and Western Ontario and McMaster Universities osteoarthritis index (WOMAC)⁵ scores. This was used to assess the consequence of PRP on knee functions in day to day activities before and after injection.

The primary hypothesis for this study is that PRP is effective in decreasing pain in patients with osteoarthritis and improving the functional result. All the consenting patients were evaluated clinically to rule out pain related to other knee pathologies. The study comprised 80 patients, with osteoarthritis who gave willingness by providing written consent.

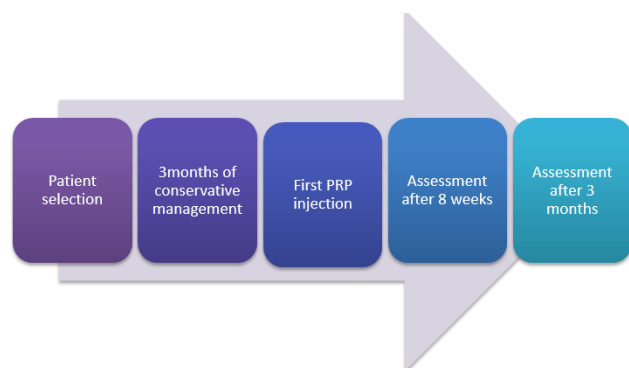


Fig. 1: Original flow diagram for study methodology showing the pre-injection and post-injection evaluation of patients using Visual analogue score and WOMAC score.

3. Platelet-Rich Plasma Preparation and Procedure

PRP was prepared using standard techniques. Initially, patient's whole blood was collected with aseptic precautions in acid citrate dextrose tubes. Around 30 ml of patient's whole blood was collected. This whole blood was subjected to centrifugation at 2000 rpm (soft spin) to separate into three layers. The supernatant layer of plasma and buffy coat were separated and subjected to further centrifugation at 3000 rpm (hard spin). The end product post this procedure was platelet-poor plasma in the upper two-third of the tube, which is removed, and the lower one-third used for injection which is the PRP enhanced with superficial buffy coat. This is performed as an op technique.

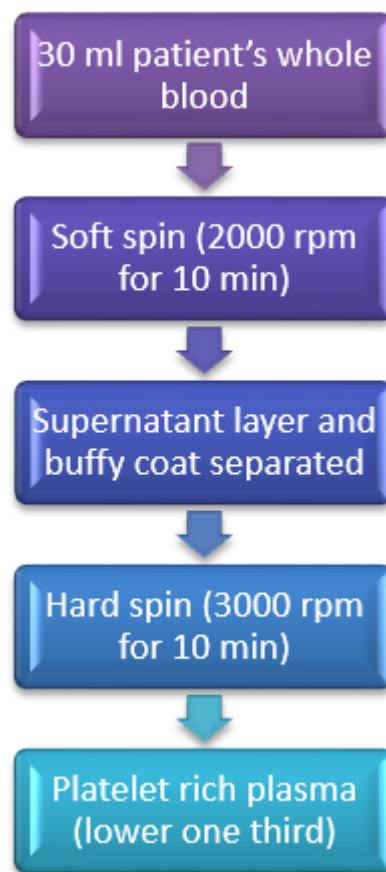


Fig. 2:

3.1. Injection technique

The procedure is done on an out-patient basis and under complete aseptic condition. 5ml of platelets concentrate is injected into the medial joint space of the knee, following which the patient is observed for 15–20 min and discharged.

3.2. Post-injection protocol

The use of NSAID is prohibited. Because there may be discomfort experienced by the patient at the site of the injection for up to 48 hours. Patients are encouraged to ice the injection site, elevate the limb, and modify activities. Patients are discharged to home with instruction to limit their activities for 48 hours and use acetaminophen for pain control. After 2 days, patients are advised to perform stretching exercises for 2 weeks with assistance from the physiotherapist and perform strengthening exercises for an additional 2-week period. At 4 weeks' post-injection, the patients are allowed to start normal recreational activities.

It is found that 73% percent of patients in our study developed pain after platelet rich plasma injection and most of the patients were relieved from pain within a week.



Fig. 3:

4. Results

All patients in this study completed a questionnaire pre-injection, 8 weeks' post-injection, 12 weeks follow up visits by using VAS and WOMAC⁵ score. This questionnaire includes the following; pain level using VAS when getting out of bed, at rest, and after activity in treating this difficult condition; effect of the procedure on patient condition; and patient satisfaction. After 3 months the VAS score is 1.8 ($p < 0.001$) and the WOMAC⁵ score improved from 78 to 32 ($p < 0.001$).

Table 1:

	Preinjection	Postinjection
No limitation of activity	0	70%
Minimal limitation of activity	5%	22%
Moderate limitation of activity	50%	8%
Severe limitation of activity	45%	0

5. Discussion

The clinical features of osteoarthritis include bony swelling, restricted range of movements, crepitus, muscle wasting, joint deformity and pain that is typically worse later in the day and relieved by rest. Plain radiographs reflect underlying bone pathology and include focal joint space narrowing and marginal osteophytes with varying degrees of subchondral bone sclerosis, bone cysts, osteochondral loose bodies and eventual bone attrition and deformity.⁶ Age is the most important risk factor for disease progression and females and obese patients are commonly affected than males.⁷ The Kellgren-Lawrence (KL) classification is used

to grade the osteoarthritis in our study. Other than platelet rich plasma, intraarticular steroid injection, intraarticular hyaluronic acid etc., used in previous studies but PRP appear more effective to other intraarticular injection.

Researchers have documented that PRP has four to six times the normal level of growth factors, which results in fibrocytes migration and induction of neurovascular growth.⁸ It demonstrates that a single injection of PRP improves pain and function more than corticosteroid injection.⁹ These improvements were sustained over time with no reported complications. One of the greatest benefits to this treatment is that the patient uses his or her own blood for the procedures. This eliminates all kinds of potential problems including disease transmission and tissue rejection.

The use of autologous PRP is not a new treatment. The healing cascade, which is the physiological response to any injury or surgical intervention, is well documented and relies on proteins that are delivered to the healing site by platelets and white blood cells in addition to those proteins that are present in the plasma. Successful tissue healing and regeneration requires a scaffold or matrix, undifferentiated cells and signal proteins and adhesion molecules (growth factors). It is well known that platelets affect mitogenic activity of cells like osteoblast, chondroblast or tenoblast.¹⁰

Injection of PRP into the affected joint addresses the healing stages necessary to reverse the degenerative process. The individual cytokines present in the platelet granules are shown to enhance fibroblast migration and proliferation, vascularization, and increase collagen deposition. In our study we did not use local anaesthetic which could lead to bias.

Contra-indications to the use of PRP include coagulopathies, concurrent anticoagulant therapy, active infection, tumour, and pregnancy. Theoretically several systemic complications may be associated with the use of PRP, as a result of systemic increase in growth factors, the injection of PRP could initiate cancer like effect but no studies to date document any data to support this concern. In our study, no complications were reported.⁸

At the end of follow up period, Eighty percent patients (80%) had complete resolution of pain and satisfied with results.

6. Conclusion

This study finds that using platelet-rich plasma (PRP) in osteoarthritis of knee joint significantly relieves pain and improves day to day activities without much complication and is very cost effective.

7. Source of Funding

None.

8. Conflict of Interest

None

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