

## Efficacy of Platelet Rich Plasma in Treatment of knee Osteoarthritis: General Survey of Cases at Tertiary Center in Kathmandu, Nepal

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### ABSTRACT

**Introduction:** Knee osteoarthritis (OA) is a common degenerative disease of knee caused by disruption of cartilage and joint inflammation. Mostly affecting the people above the age of 60, OA is one of the topmost disease causing disability in elderly population. The prevalence of OA in Nepal is also high. Traditional treatment protocols including analgesics, steroid, physiotherapy are refractory after certain level and knee replacement is highly expensive in Nepal. Platelet Rich Plasma (PRP) therapy has emerged as one of the convincing treatment method for OA.

**Methods :** This prospective cross sectional study was conducted at Annapurna Neurological Institute and Allied Sciences, Kathmandu, Nepal which included total of 203 patients with knee OA, they were treated with PRP injection and the results were evaluated using Ms excel and SPSS.

**Results:** The results demonstrated, the pain subsided by 57.72% after administration of 3rd dose of PRP. The WOMAC scoring before PRP was 80 (mean value), which reduced to 72, 52 and 34 after the first, second and third dose respectively.

**Conclusion:** Platelet-Rich Plasma (PRP) therapy has shown promising results as a potential treatment option for knee osteoarthritis. The results proved PRP as an effective, minimally invasive, and relatively cheaper treatment option for patients with knee OA.

**Keywords:** Osteoarthritis, Platelet rich plasma, Inflammation, Intervention.

### INTRODUCTION

Knee osteoarthritis (OA) is a chronic, progressive condition characterized by cartilage degeneration, joint inflammation, and pain. Knee (OA) is a one of the major joint disorder that affects thousands of people worldwide.<sup>1</sup> It is one of the most disabling conditions, affecting more than one-third of the population above 65 years of age. Knee osteoarthritis (OA), in particular, is usually attributed to aging and obesity and has almost doubled in prevalence since the past two centuries. It poses a significant burden on healthcare systems and negatively impacts the quality of life for affected individuals.<sup>2</sup> Various treatment procedures, from medical management to surgical procedures have emerged for the management

of knee OA, impacts the quality of life for affected individuals.<sup>2</sup> Various treatment procedures, from medical management to surgical procedures have emerged for the management of knee OA, which includes analgesics, physiotherapy, total knee replacement and so on. Traditional treatment modalities usually focus on symptom management rather than promoting tissue regeneration and cartilage repair. There has been a need of more effective and minimally invasive treatment modality which overcomes the drawbacks of traditional system.<sup>3</sup>

In recent years, Platelet-Rich Plasma (PRP) has been adopted as a potential therapeutic option for knee OA,

offering a regenerative approach through growth factor release and anti-inflammatory properties. Platelet-Rich Plasma (PRP) has garnered increasing attention due to its regenerative potential and has been explored as an alternative treatment for knee OA. This literature review aims to synthesize the available evidence on PRP therapy in knee OA, evaluating its efficacy and potential mechanisms of action.<sup>4</sup>

PRP contains a high concentration of growth factors, such as transforming growth factor-beta (TGF-β), platelet-derived growth factor (PDGF), insulin-like growth factor (IGF), and vascular endothelial growth factor (VEGF). These growth factors play a crucial role in tissue repair, angiogenesis, and anti-inflammatory responses. By releasing these bioactive substances, PRP may stimulate chondrocyte proliferation, extracellular matrix synthesis, and inhibit inflammatory cytokines, contributing to the regeneration of damaged cartilage and reducing inflammation in knee OA.<sup>5-7</sup>

## METHODS

This cross sectional prospective study was conducted at Annapurna Neurological Institute and Allied Sciences (ANIAS) after getting approval from Institutional Review Committee. Patients who arrived at ANIAS, out-patient department with chief complaint of knee pain and those underwent the procedure of PRP therapy were included.

In this study, total of 203 patients from April 2021 to February 2023 with PRP injection with complete 3 (three) doses and three month follow up were included. Platelet-rich plasma was prepared using a REMI Centrifuge Machine. The 10-30 ml blood was drawn into PRP Tube contains Anticoagulant Acid Citrate Dextrose (ACD-A), the tube was then gently inverted several times to mix the anti-coagulant with the blood sample. Sample was then centrifuged - first for 5 minutes for precooling, then 12-15 minutes for Separation, then last 6 minutes for Concentration. After centrifugation, the tubes were gently agitated to ensure all visible platelet aggregates detach from the separating gel and the tube wall, and 5-6 mL was gently withdrawn into a 10 cc syringe. Using 18-20-gauge needle 5-6 ml PRP was inserted in knee joint using aseptic condition. Same procedure is done for 3 doses in every 7-15 days' interval. The data was entered in MS excel and was analysed using SPSS version 21. Descriptive data was entered and presented in table.

## RESULTS

The study included total of 203 patients with an average age of 65±9 years (ranging from 50 to 80 years). The Male:Female ratio was 10:9 (106 males and 97 females). The mean time frame for which they had been experiencing knee pain was 3.4±1.7 years (ranging from 2 years to 6 years), most of them were refractory to medical management with analgesics. Furthermore, the cases included 164 patients with single knee pain while 39 has bilateral pain.

The results were evaluated based on Western Ontario and McMaster Universities Arthritis Index (WOMAC) scoring, which incorporated the rating for pain, restrained physical activity and stiffness. Scoring was classified as 0 to 20 for pain, 0 to 8 for stiffness and 0 to 68 for physical activity. This included a set of 24 questionnaires, each had a labelling of 0 to 4, with 0 being completely fine and 4 being the worst pain or restriction to physical activity. Table 1 depicts the demographic data of patients included in the study. While table 2 shows the average WOMAC scoring at the time of OPD, after first dose of PRP, followed by other two doses. The Scoring for the last dose was done after three months follow up.

**Table 1 : Demographics & clinical characteristics of the patient**

Age	50 years to 80 years (203)	65.02±8.54
<b>Age Group</b>	<b>Frequency</b>	<b>Percentage</b>
50 to 60 years	73	35.96%
60 to 70 years	81	39.90%
70 to 80 years	49	24.14%
<b>Gender</b>		
Male	106	52.21%
Female	97	47.79%

**Table 2: Affected knee due to OA**

<b>Pain site</b>	<b>Unilateral</b>	<b>Bilateral</b>
	164	39
Percentage	80.07%	19.93%

**Table 3: WOMAC scoring table**

	<b>Initial Assessment</b>	<b>1st Dose</b>	<b>2nd Dose</b>	<b>3rd Dose</b>
WOMAC Scoring	79.81	71.69	52.03	33.90
Reduction	----	8.11	27.77	45.91
Percentage Change	----	10.17%	34.79%	57.52%

The results showed the pain scoring for the patients with OA at the time of arrival to be 79.81 on average, the scores were significantly reduced to 33.90 after the 3rd dose of PRP has been completed. There was 10% improvement of symptom after first dose, which was further improved by 28% after the second dose administered after 2 weeks. The final dose was given 2 weeks after 2nd dose and scores were assessed after three months follow up. The scores reevaluated after three months suggest the improvement of symptoms by 58% as that of symptoms at the time of initial assessment. 58% reduction in symptoms proved PRP as an effective treatment for knee OA.

### DISCUSSION

This report aims to critically evaluate the existing evidence on the efficacy, safety, and mechanisms of action of PRP in knee OA conducted at Tertiary Hospital in Kathmandu, Nepal. Osteoarthritis occurs when chondrocytes fail to maintain balanced homeostasis between synthesis and degradation of the ECM components, however, the exact cause for the initiation of this imbalance is not clearly understood.<sup>3-8</sup> Most of the studies and past clinical records show the physical trauma and microfractures or inflammation to be the cause for increased enzymatic activity leading to formation of more wear particles. Accumulation of such wear particles makes process of elimination of unwanted ECM particles by the macrophases harder, leading to initiation of inflammation.<sup>6-9</sup> Inflammatory response in early stage causes mild pain and are sometimes treated with analgesics and physio therapy. However, on a long run, this inflammation ceases the synthesis of ECM at the joints, which is refractory to oral medication and physio therapy.<sup>10,11</sup> In such situation, the available options would be regeneration of ECM components through PRP or the replacement of osteoarthritic knee with an artificial/prosthetic knee.<sup>12</sup>

Numerous clinical trials and observational studies have evaluated the effectiveness of PRP in knee OA. While the results have been somewhat mixed, many studies reported significant improvements in pain, function, and quality of life following PRP treatment. The heterogeneity in study design, PRP preparation protocols, and outcome measures may account for some variations in findings. However, overall, PRP appears to offer a promising alternative for symptom relief and functional enhancement in knee OA patients.<sup>5,13</sup>

PRP has generally demonstrated a favorable safety profile in knee OA treatment. Adverse events are typically mild and self-limiting, such as transient pain or swelling at the injection site.<sup>7</sup> However, more

extensive and long-term safety data are needed to draw definitive conclusions regarding its safety profile.

### CONCLUSION

Platelet-Rich Plasma (PRP) therapy has shown promising results as a potential treatment option for knee osteoarthritis. The evidence suggests that PRP is capable of improving pain, function, and quality of life in affected individuals, possibly through the release of growth factors that promote tissue regeneration and have anti-inflammatory effects. However, patient selection and tailored treatment plans should be endorsed to achieve the best clinical outcomes.

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