International Journal of Biotechnology and Clinical Medicine ISSN 2583-4665
Vol.3, No.3, July - Sep 2024, pp. 88~91

EVALUATING THE EFFECTIVENESS OF PLATELET-RICH PLASMA IN TREATING KNEE

H. Prayank[1], G. Jayalakshmi[1*]
[1]Department of Microbiology, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry - 605502, India.

Article Info

Article history:

Received August 14th, 2024
Revised August 28th, 2024
Accepted September 5th, 2024

Keyword:

Knee disorder
Platelets
Plasma
Pain relief

ABSTRACT

This randomized control trial aimed to evaluate the effectiveness of autologous platelet-rich plasma (PRP) in the conservative management of knee osteoarthritis. Sixty patients diagnosed with osteoarthritis and meeting the study's inclusion criteria were divided into two groups: 30 received intra-articular PRP injections (test group), and 30 received normal saline (control group). Patients were assessed using the WOMAC and VAS scales to measure pain, stiffness, and physical function at pre-injection, 6 weeks, 3 months, and 6 months post-injection. The results showed a significant reduction in pain and stiffness and improved physical function in the PRP group, while the control group experienced only temporary pain relief due to the placebo effect. Baseline characteristics, including age, BMI, and WOMAC scores, were comparable between the two groups. This study demonstrates that autologous platelet-rich plasma is a superior and cost-effective treatment compared to normal saline for managing knee osteoarthritis over a six-month period.

Corresponding Author:

Dr. G. Jayalakshmi,
Department of Microbiology, Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry - 605502, India.
Email: jayalakshmi.2k15@gmail.com

How to Cite:

Prayank H & Jayalakshmi G. Evaluating the effectiveness of platelet-rich plasma in treating knee. IJBTCM. 2024; Volume 3 (Issue 3): Page 88-91.

1. INTRODUCTION

Osteoarthritis is a joint condition when all of the components have failed, mostly due to hyaline cartilage degradation [1]. Due to its great prevalence, particularly among the elderly, and its negative effects on everyday activities, it is a major contributor to impairment in this age range [2]. Aging and obesity are contributing to an increase in osteoarthritis prevalence. Hyaline cartilage loss, increased thickness and sclerosis of subchondral bone, marginal osteophytes, and meniscal degeneration are some of the pathological alterations associated with osteoarthritis [3]. Although there are many other paths that end in joint failure, joint damage is frequently the first one because preventive systems have failed [4]. Because of its uneven distribution and frequent association with aberrant loads rather than frictional wear, osteoarthritis differs from simple wear and tear [5]. Osteoarthritis is also linked to prior joint damage after any trauma and is referred to as secondary osteoarthritis [6]. In India, the prevalence of primary osteoarthritis ranges from 22 to 39 percent1 and mostly affects middle-aged to elderly people [7]. It is virtually invariably linked to a history of repeated joint loading. However, articular cartilage metabolic derangements are occasionally observed in patients [8-10].

2. METHODS

Patients were evaluated using the WOMAC scale for criteria such as pain, stiffness, and physical function, as well as the VAS for pain at pre-injection, 6 weeks after injection, 3 months after injection, and 6 months after injection. Patients who complained of bilateral knee discomfort and were seen by the orthopedics department at Sri Lakshmi Narayana Institute of Medical Sciences between September 2018 and August 2020 were screened, and those who were found to have osteoarthritis of the knee were chosen for the research. Age, gender, height, body mass index, and WOMAC score were compared between the two groups after randomization. Also

compared between pre- and post-injection were other factors, including pain, stiffness, and physical function. Due to the failure of preventive mechanisms and an imbalance between cartilage degeneration and regeneration, osteoarthritis is a clinically heterogeneous degenerative disorder that is characterized by the degradation of articular cartilage.

In our study, we randomly separated 60 people with osteoarthritis characteristic symptoms into two groups: the test participants and the control group. Age, height, weight, BMI, and pre-injection WOMAC score were the baseline parameters used to compare the two groups. For 30 of these patients, intra-articular platelet-rich plasma was administered, while the remaining 30 patients received normal saline as a control. For both the study and control groups, the effectiveness of platelet-rich plasma in lowering pain, stiffness, and physical function was evaluated and rated in accordance with the WOMAC scoring system. Unpaired t-test and chi-square test were used to analyze the data.

Group 1 (the test group) had a mean BMI of 26.96, whereas group 2 (the control group) had a mean BMI of 26.9. 0.9368 was determined to be the p-value. The BMI was discovered to be unimportant. As a result, our study made sure that the baseline characteristics of all the patients were comparable. Thus, patients treated with autologous platelet-rich plasma experienced a significant reduction in pain, whereas those in the test group who received injections of normal saline experienced a temporary reduction in pain due to the placebo effect before experiencing a return of pain and stiffness. This proves that autologous platelet rich plasma is superior to normal saline for the conservative management of osteoarthritis.

3. RESULTS

The table provides a comprehensive comparison between the test group, which received intra-articular platelet-rich plasma (PRP) injections, and the control group, treated with normal saline, in the management of knee osteoarthritis. It begins with a breakdown of the baseline characteristics, including age and body mass index (BMI), which were comparable between the two groups. This ensures that both groups were evenly matched and that differences in outcomes could be attributed to the treatments themselves rather than underlying demographic or physical variations. Notably, the mean BMI was similar between the PRP group (26.96) and the control group (26.9), and the p-value of 0.9368 suggests that BMI differences were not statistically significant. This baseline parity reinforces the reliability of the study's findings. The assessment tools used to measure outcomes were the Western Ontario and McMaster Universities Arthritis Index (WOMAC) and the Visual Analog Scale (VAS) for pain, administered at various intervals: pre-injection, 6 weeks, 3 months, and 6 months post-injection. These tools provided a robust and multidimensional analysis of key factors affecting osteoarthritis patients: pain, stiffness, and physical function. The consistency in follow-up intervals allowed for a thorough evaluation of both short- and long-term effects of PRP compared to normal saline.

The most significant findings emerged in the post-treatment results, where the test group that received PRP showed substantial improvements in all measured domains. There was a marked reduction in pain and stiffness and a considerable improvement in physical function, as measured by WOMAC and VAS scales. These effects were maintained over the six-month follow-up period, indicating that PRP provided lasting benefits in managing osteoarthritis symptoms. In contrast, the control group, which received normal saline, experienced only temporary relief from pain, likely due to the placebo effect, but no sustained improvement was noted in stiffness or physical function over the same period.

This stark contrast in outcomes between the two groups highlights the therapeutic potential of autologous PRP for knee osteoarthritis. The PRP group's significant and prolonged reduction in symptoms underscores its effectiveness as a conservative management option. Additionally, the fact that patients in the control group experienced a recurrence of pain and stiffness shortly after treatment further emphasizes the inadequacy of normal saline as a long-term solution. The table effectively illustrates that PRP is not only superior to normal saline but also provides clinically meaningful benefits that align with the needs of osteoarthritis patients seeking durable relief from symptoms.

In conclusion, the table illustrates the primary outcomes of this randomized control trial, demonstrating that PRP is a viable and effective alternative for treating knee osteoarthritis. It also emphasizes that baseline characteristics, such as BMI and age, were well-controlled, and thus, any differences in outcomes were due to the treatment modalities. These findings support the growing body of evidence that suggests autologous PRP is a promising, cost-effective intervention for knee osteoarthritis, offering significant and lasting improvements in pain, stiffness, and physical function over a six-month period..

Table 1. Comparison of Baseline Characteristics, Treatment Methods, and Outcomes between the PRP and Control Groups in the Management of Knee Osteoarthritis

Parameter	Test Group (PRP)	Control Group (Normal Saline)
Number of Patients	30	30
Baseline Characteristics		
- Age (mean)	Comparable	Comparable
- BMI (mean)	26.96	26.9
- P-value (BMI)	0.9368 (not significant)	
Assessment Tools		
- WOMAC (Pain, Stiffness, Physical Function)	Pre-injection, 6 weeks, 3 months, 6 months	Pre-injection, 6 weeks, 3 months, 6 months
- VAS (Pain)	Pre-injection, 6 weeks, 3 months, 6 months	Pre-injection, 6 weeks, 3 months, 6 months
Follow-up Period	6 weeks, 3 months, 6 months	6 weeks, 3 months, 6 months
Treatment Administered	Intra-articular PRP injections	Intra-articular normal saline
Results		
- Pain Reduction	Significant	Temporary due to placebo effect
- Stiffness Reduction	Significant	Temporary
- Physical Function Improvement	Significant	No significant long-term improvement
Conclusion	PRP is effective and superior to normal saline in managing osteoarthritis	Placebo effect, no long-term benefit

4. CONCLUSION

In our trial, we injected a concentrated platelet combination into the joint cavity and monitored the patients' physical function, stiffness, and pain levels. Our research showed that patients who received autologous platelet-rich plasma injections saw a substantial decrease in pain, stiffness, and an increase in physical performance.

FUNDING

Nil

ETHICAL APPROVAL

Nil

COMPETING INTEREST

The authors declare no conflict of interest.

REFERENCES

1. Dai WL, Zhou AG, Zhang H, Zhang J. Efficacy of platelet-rich plasma in the treatment of knee osteoarthritis: a meta-analysis of randomized controlled trials. Arthroscopy: The Journal of Arthroscopic & Related Surgery. 2017 Mar 1;33(3):659-70.
2. Sánchez M, Jorquera C, de Dicastillo LL, Fiz N, Knörr J, Beitia M, Aizpurua B, Azofra J, Delgado D. Real-world evidence to assess the effectiveness of platelet-rich plasma in the treatment of knee degenerative pathology: A prospective observational study. Therapeutic Advances in Musculoskeletal Disease. 2022 Jun;14:1759720X221100304.
3. Nie LY, Zhao K, Ruan J, Xue J. Effectiveness of platelet-rich plasma in the treatment of knee osteoarthritis: a meta-analysis of randomized controlled clinical trials. Orthopaedic Journal of Sports Medicine. 2021 Mar 2;9(3):2325967120973284.
4. Kavadar G, Demircioglu DT, Celik MY, Emre TY. Effectiveness of platelet-rich plasma in the treatment of moderate knee osteoarthritis: a randomized prospective study. Journal of Physical Therapy Science. 2015;27(12):3863-7.
5. Hegaze AH, Hamdi AS, Alqrache A, Hegazy M. Efficacy of platelet-rich plasma on pain and function in the treatment of knee osteoarthritis: A prospective cohort study. Cureus. 2021 Mar;13(3).
6. Hong M, Cheng C, Sun X, Yan Y, Zhang Q, Wang W, Guo W. Efficacy and safety of intra-articular platelet-rich plasma in osteoarthritis knee: a systematic review and meta-analysis. BioMed research international. 2021;2021(1):2191926.
7. Qamar AD, Mohsin SN, Siddiqui UN, Naz SA, Danish SA. Effectiveness of platelet rich plasma for the management of knee osteoarthritis: A randomized placebo controlled trial. Pakistan J Med Health Sci. 2021;7:1553-6.
8. Aiyer R, Noori S, Schirripa F, Schirripa M, Aboud T, Jain S, Gulati A, Puttanniah V, Gungor S, Hunter C. Treatment of knee osteoarthritic pain with platelet-rich plasma: A systematic review of clinical studies. Pain Management. 2021 Jul 1;11(4):419-31.
9. Saita Y, Kobayashi Y, Nishio H, Wakayama T, Fukusato S, Uchino S, Momoi Y, Ikeda H, Kaneko K. Predictors of effectiveness of platelet-rich plasma therapy for knee osteoarthritis: a retrospective cohort study. Journal of Clinical Medicine. 2021 Sep 29;10(19):4514.
10. ÇALIŞ HT, Sütbeyaz ST, Güler E, Halici C, Sayan H, Ali KO, Metin KO, YAZICIOĞLU JA. Efficacy of intra-articular autologous platelet rich plasma application in knee osteoarthritis. Archives of Rheumatology. 2015;30(3):198-205.