Vol.1, No.1, April 2022, pp. 01~08

AN AUTOLOGOUS PLATELET-RICH PLASMA INJECTION CAN TREAT OSTEOARTHRITIS OF THE KNEE

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Article Info

Article history:

Received March 22nd, 2022
Revised April 20th, 2022
Accepted April 30th, 2022

Keyword:

Osteoarthritis
Autologous platelet
Arthroplasty
symptoms
Knee joint

ABSTRACT

Platelet rich plasma is postulated to modify the disease process and believed to cause regeneration of the articular cartilage, unlike other conservative methods which provide symptomatic relief and halt the degenerative process. Autologous platelet rich plasma is a cost effective tool that could obviate the requirement for joint replacement arthroplasty or at least decrease the number of revision surgeries. To evaluate the role of autologous platelet rich plasma in the patients diagnosed with primary osteoarthritis and to find out whether it will be a cost effective method for delaying the need for surgery keeping in mind the side effects and its role as a disease modifying modality.

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How to Cite:

Prayank *et. al.* An autologous platelet-rich plasma injection can treat osteoarthritis of the knee. IJBTCM. 2022; Volume 1 (Issue 1): Page 01-08.

1. INTRODUCTION

Osteoarthritis is a joint failure characterised by pathologic alterations to all of the joint's tissues, particularly hyaline cartilage degradation. It is quite common, especially in the elderly, and because of its negative influence on everyday activities, it is a significant cause of impairment in the elderly. Osteoarthritis is becoming more common as people age and become overweight [1-5]. Certain joints are affected by osteoarthritis, whereas others are not. The hip, knee, first metatarsophalangeal (MTP) joint, and cervical and lumbosacral spine are all typically affected [6-10]. The distal and proximal interphalangeal joints, as well as the first carpometacarpal (CMC), are all involved in the hands. The wrist, elbow, and ankle joints are usually unaffected [10-13].

Radiographic abnormalities such as reduced joint space and osteophytes can be used to diagnose osteoarthritis; however, most persons occupational handicap, visits to physicians, and illness costs, is what we're concerned with. Joint failure can be caused by a variety of factors, but the first stage is frequently joint damage caused by the failure of protective systems [14-20]. Osteoarthritis differs from ordinary wear and tear in that it has an uneven distribution and is frequently linked to aberrant loading rather than frictional wear [21]. Secondary osteoarthritis is osteoarthritis caused by a prior damage to the joint as a result of any trauma [22]. Primary osteoarthritis affects 22-39 percent of people in India [23], mostly in the medium to older age groups, and is virtually invariably linked to a history of repeated joint loading. A few individuals, however, have metabolic articular cartilage derangements.

2. METHOD

2.1. Study design

Randomized control trial. At pre-injection, 6 weeks post-injection, 3 months post-injection, and 6 months post-injection, patients were assessed for pain, stiffness, and physical function using the WOMAC scale, as well as pain using the visual analogue scale. Patients with bilateral knee discomfort who visited the in-patient and outpatient orthopaedic departments at Sri Lakshmi Narayana Institute of Medical Sciences from September 2018 to August 2020 were screened, and those who were diagnosed with osteoarthritis knee were chosen for the study.

At pre-injection, 6 weeks post-injection, 3 months post-injection, and 6 months post-injection, patients were assessed for pain, stiffness, and physical function using the WOMAC scale, as well as pain using the visual analogue scale. Patients with bilateral knee discomfort who visited the in-patient and outpatient orthopaedic departments at Sri Lakshmi Narayana Institute of Medical Sciences from September 2018 to August 2020 were screened, and those who were diagnosed with osteoarthritis knee were chosen for the study. Group 1 was the study group, which received an intra-articular injection of platelet rich plasma in both knees. Group 2 was the control group, which received intra-articular normal saline. Both groups were compared in terms of age, gender, height, BMI, and WOMAC score after being randomly assigned. Other factors including pain, stiffness, and physical function were compared before and after the injection.

2.2. Exclusion criteria

Immunosuppresed patients.
Patients with connective tissue disorders.
Patients who have received steroid injections within past 6 months.

2.3. Inclusion criteria

Patients with primary osteoarthritis.
Patients willing to participate in the study.

2.4. Injection protocol

The patients were put supine on the surgery table in the emergency room under strict aseptic conditions, with all parts painted and draped. Under sterile aseptic conditions, 8 ml of Platelet Rich Plasma was combined with 2 ml of calcium gluconate and injected into the suprapatellar pouch of the knee or into the joint cavity through the medial approach. Following the injection, the patient was told to stay in bed for two days. The patient was told to stay away from NSAIDS for two days before and after the injection. In situations of febrile sickness or severe discomfort, 500mg of paracetamol was permitted. 8ml of Normal Saline was injected into the suprapatellar pouch of the patients in the control group. From Day 2, the patients were instructed to resume their normal job schedule.

2.5. Outcome analysis

All of the patients in the trial were followed up on at 6 weeks, 3 months, and 6 months after injection, respectively. The WOMAC scale was used to assess the efficacy of the treatment for pain relief, stiffness reduction, and improved physical function. Patients were also given a pain assessment using a visual analogue scale before and after the injection.

3. RESULTS AND ANALYSIS

Osteoarthritis is a clinically heterogeneous degenerative disorder defined by the degradation of articular cartilage due to the failure of preventive systems and an imbalance between cartilage degeneration and regeneration. In our study, we randomly selected 60 participants with characteristic osteoarthritis symptoms and separated them into two groups: test subjects and control subjects. The baseline variables of age, height, weight, BMI, and pre-injection WOMAC score were compared between the two groups. Thirty patients received intra-articular platelet rich plasma, while the other thirty received normal saline as a control. For both the study and control groups, the efficacy of platelet rich plasma in lowering pain, stiffness, and physical function was examined and rated using the WOMAC scoring index. Unpaired t test and chi square test were used to analyse the data. The mean age in group 1 (the test group) was 54.1, whereas the mean age in group 2 (the control group) was 54.7. (figure 1). The age factor was determined to be negligible with a p-value of 0.7798 using an unpaired t test.

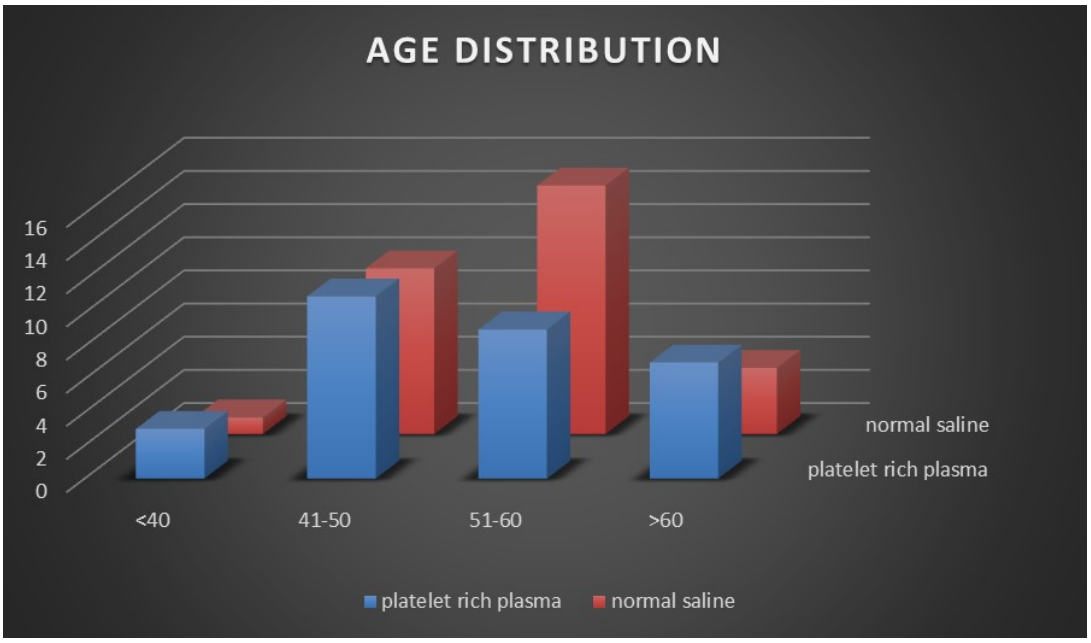

Figure 1. Age distribution

When the gender distribution in both groups was examined, it was determined to be 56.67 percent in men and 43.3 percent in females (Figure 2). Using the chi square test, the p-value was found to be 0.7953. As a result, the gender factor had no bearing.

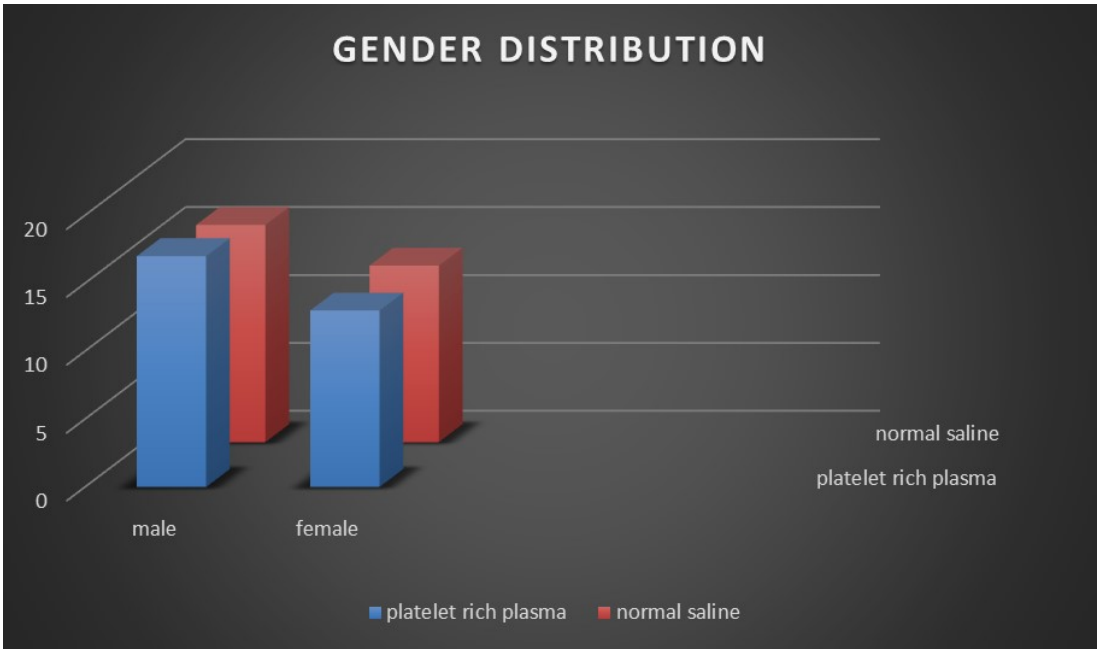

Figure 2. Gender distribution

The mean height in group 1 (the test group) was 156.9 cm, whereas the mean height in group 2 (the control group) was 157.5 cm. The height factor was found to be negligible with a p-value of 0.7369 using an unpaired t test (Figure 3).

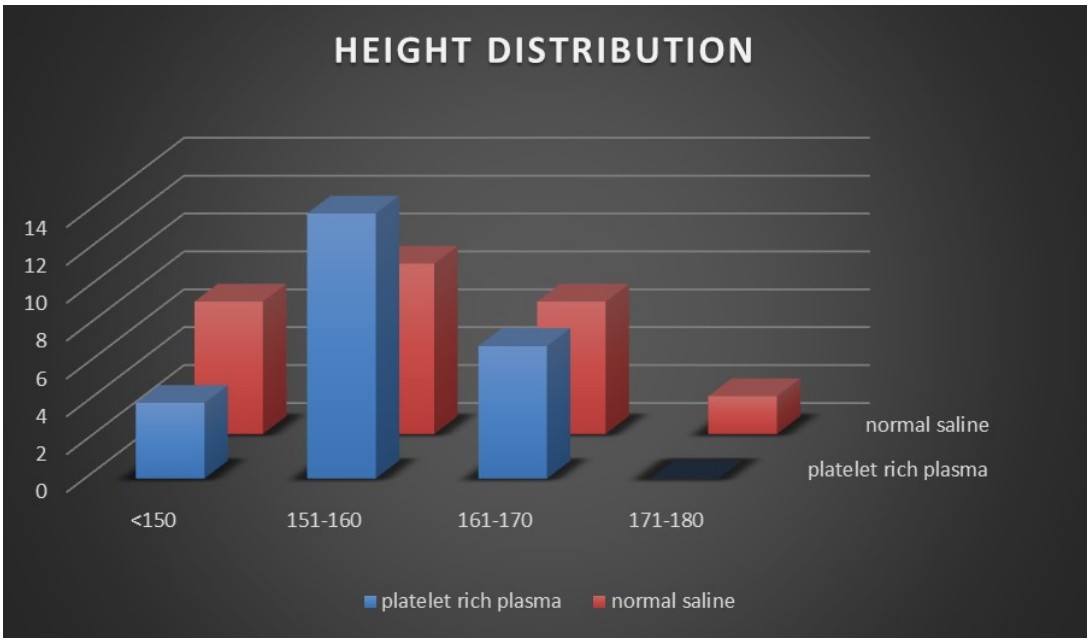

Figure 3. Height distribution

The mean weight in group 1 (the test group) was 66.2 kg, whereas the mean weight in group 2 (the control group) was 66.2 kg. 1.0000 was found to be the p-value. The weight component had no bearing on the outcome (Figure 4).

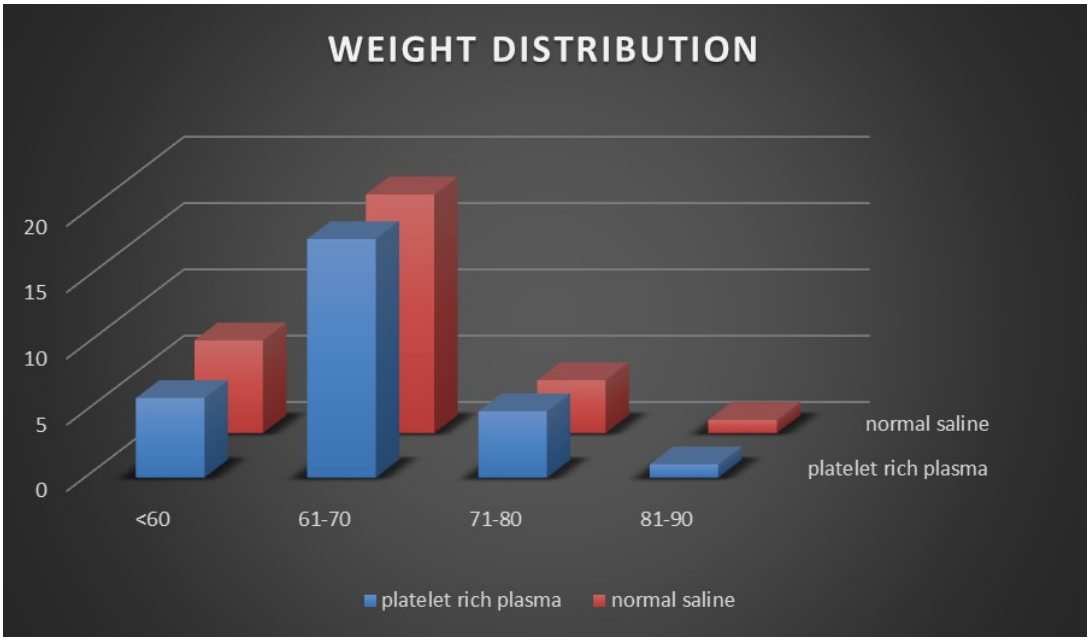

Figure 4. Weight distribution

The mean BMI in group 1 (the test group) was 26.96, whereas the mean BMI in group 2 (the control group) was 26.9. The p-value was calculated as 0.9368. The BMI was discovered to be unimportant (Figure 5).

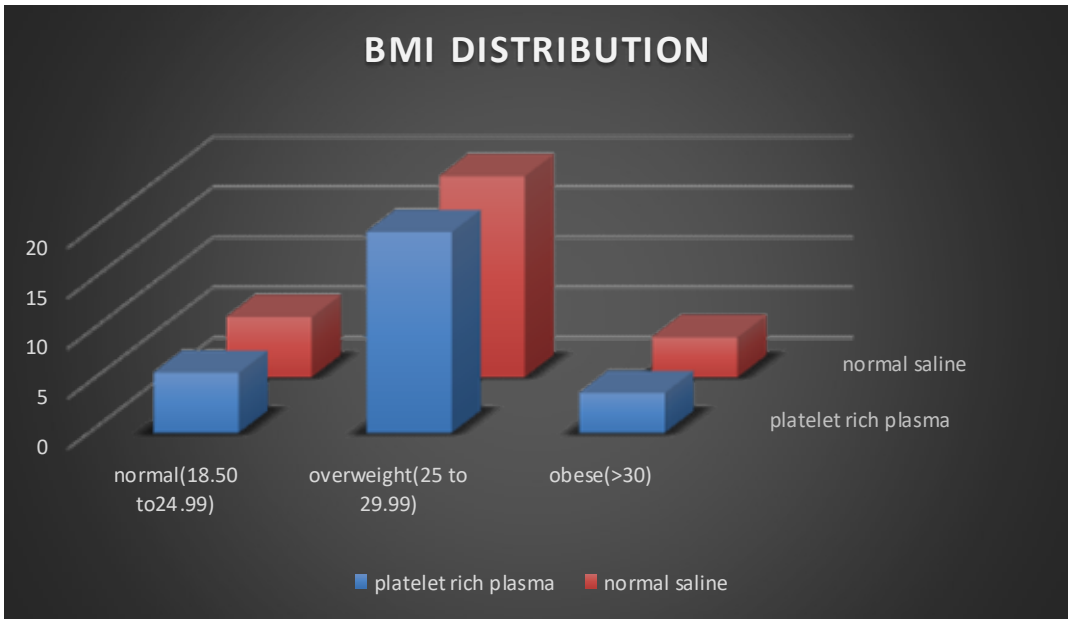

Figure 5. BMI distribution

As a result of our research, we were able to guarantee that all of the patients had similar baseline characteristics. The overall WOMAC score was 73.3 at pre-injection, 61.6 at 6 weeks, and 46.03 at 3 months, all of which declined to 32.1 at 6 months. The global WOMAC score decreased significantly in our study, and this trend continued throughout the study period (Figure 6).

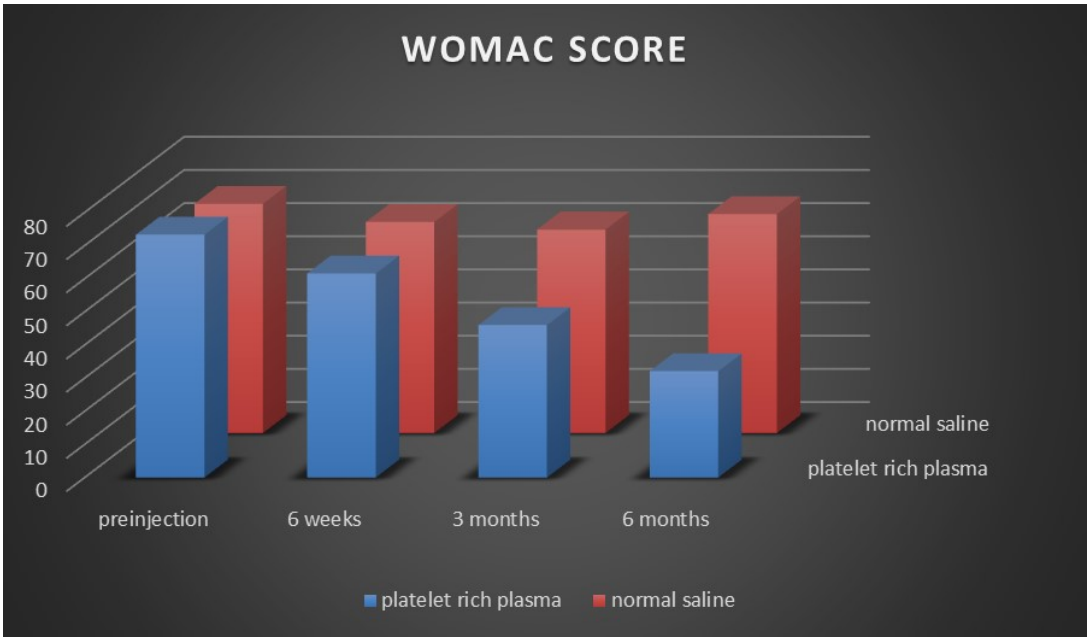

Figure 6. WOMAC distribution

Individual factors including pain, stiffness, and physical function were evaluated. At 6 weeks after injection, the mean pain score dropped from 16.4 to 11.7, and at 3 months, it dropped to 7.36. After a six-month follow-up, the average pain score was determined to be 5.5. At 6 weeks after injection, the mean pain score in

group 2 (control group) decreased somewhat from 16.2 to 13.9, but rebounded to 15.7 at 6 months. Using an unpaired t test, the p-value revealed a substantial improvement. At the three-month and six-month follow-ups, secondary variable stiffness revealed a significant difference (Figure 7).

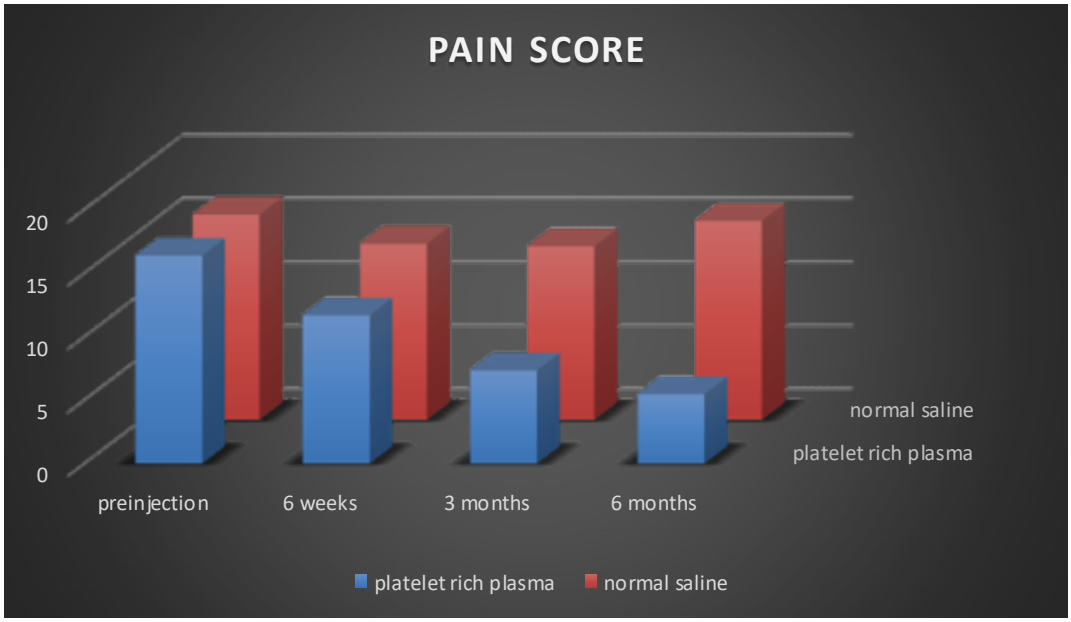

Figure 7. WOMAC distribution

The mean physical function in group 1 decreased from 51.3 before injection to 23.2 after 6 months (test group). At 3 months after injection, Group 2 (test group) exhibited a small drop in mean physical function scores from 48.3 to 45.4 and 43.6. After six months, the score had stabilised at 46.1.

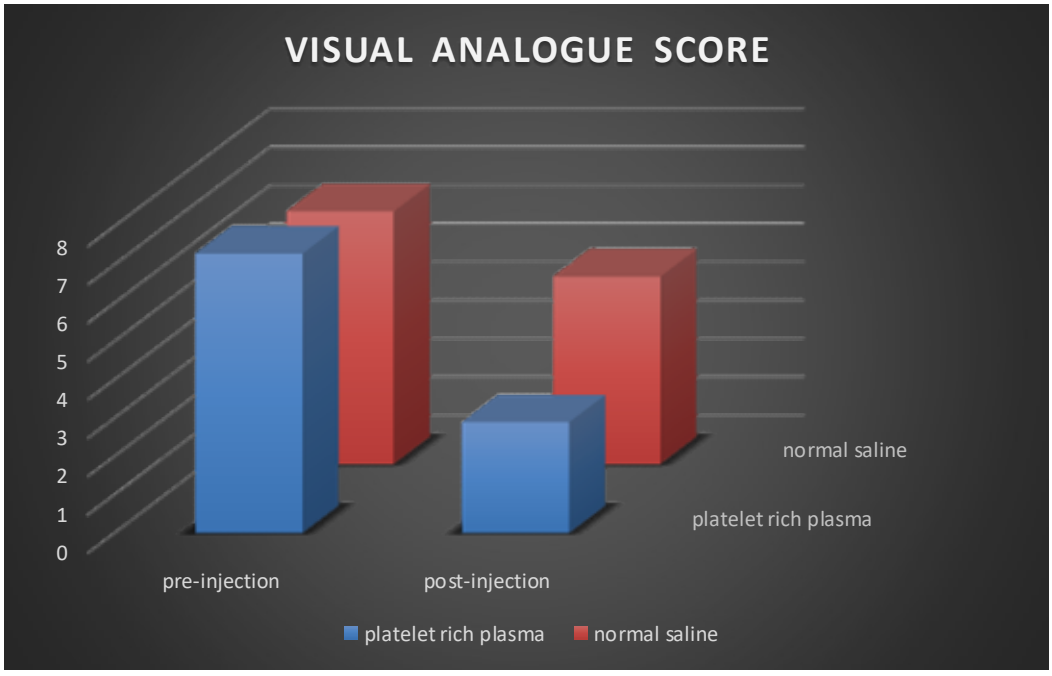

Figure 8. Visual analog score

In group 1, the visual analogue score decreased from 7.3 to 2.9, indicating a decrease in the patients' sense of pain from strong, awful, horrific pain to light, irritating pain (test group). The pain levels in Group 2 (the control group) dropped somewhat from 6.6 to 4.9, indicating modest decreases in pain. Thus, patients treated with autologous platelet rich plasma experienced a significant reduction in pain, whereas patients treated with normal saline experienced a temporary reduction in pain due to the placebo effect, but eventually experienced a return of pain and stiffness (Figure 8).

4. CONCLUSION

Osteoarthritis is a degenerative disease that causes diarthrodial joint failure and articular cartilage degeneration due to the failure of numerous protective systems. Depending on the stage of the illness, conservative therapies such as lifestyle modification and physiotherapy, as well as surgical techniques such as joint replacement arthroplasty, are used to treat osteoarthritis. Osteoarthritis can be managed conservatively with physiotherapy, nonsteroidal anti-inflammatory drugs, intra-articular glucocorticoid injections, intra-articular hyaluronic acid injections, and so on, or arthroscopically with debridement. Joint replacement arthroplasty is used in advanced instances of osteoarthritis if conservative treatment has failed to deliver adequate outcomes. The use of NSAIDs to treat osteoarthritis is linked to an increased risk of gastrointestinal issues, with an alarming increase in NSAID-induced multisystem disorders. Joint replacement arthroplasty is a definitive treatment, but it is reserved for advanced cases with failed conservative management; additionally, postoperative morbidity, cost concerns, the need for technical expertise, and the possibility of revision keep arthroplasty from being the most common form of treatment. Attempts at cartilage regeneration employing mesenchymal stem cells and autologous osteochondral plugs, as well as autologous chondrocyte transplantation, are now in the experimental stage.

Unlike other therapy techniques that try to stop the disease process, autologous platelet rich plasma acts as an entity to offer articular cartilage repair, therefore working as a disease modifying strategy for osteoarthritis. Platelet rich plasma has a positive impact on articular cartilage regeneration in synovial joints due to the presence of different growth agents in platelets. In our trial, we injected a concentrated platelet combination into the joint cavity and monitored the patients for pain relief, stiffness reduction, and improved physical function. In patients injected with autologous platelet rich plasma, we found a substantial decrease in pain, stiffness, and improvement in physical performance. Despite the fact that the patients injected with normal saline as a control group initially improved with reduced pain due to the placebo effect, their symptoms resurfaced after a period of time during the follow-up. As a result, we may conclude that autologous platelet rich plasma is an intriguing modality for the conservative treatment of osteoarthritis of the knee, and that it has been shown to be a successful and cost-effective approach during a six-month observation period..

ACKNOWLEDGEMENTS

The encouragement and support from Bharath University, Chennai is gratefully acknowledged. For provided the laboratory facilities to carry out the research work.

FUNDING

Nil

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

COMPETING INTEREST

The authors declare no conflict of interest.

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