Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/18069
DOI URL: http://dx.doi.org/10.21474/IJAR01/18069

RESEARCH ARTICLE

A PROSPECTIVE STUDY OF EFFICACY AND OUTCOME ANALYSIS OF ROLE OF PRP INJECTION IN OSTEOARTHRITIS OF KNEE JOINT 40 CASES PROSPECTIVE ANALYSIS

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Manuscript Info

Manuscript History
Received: 31 October 2023
Final Accepted: 30 November 2023
Published: December 2023

Abstract

Background: Knee osteoarthritis is a progressive debilitation degenerative disease of the cartilage of the knee. In severe conditions, the patient is unable to do basic activities of daily living also. The pain associated with severe cartilage degeneration is excruciating. Platelet rich plasma being autologous in nature, the chances of disease transmission are also very less. This study aims to evaluate the efficacy in terms of pain relief and functional outcome of platelet rich plasma in patients with knee osteoarthritis with Kellgren-Lawrence Grade I, II and III.

Material and Method: This study was conducted in the Department of Orthopedics, Arihant Hospital and Research Centre, Indore during the study period of 2 years. We included 29 patients with primary osteoarthritis of knee with age more than 35 years and who were willing to undergo this procedure. After preliminary evaluation of the knee with radiograph and confirming the fitness of the patient for the procedure, these patients were given injection of PRP and were instructed on post procedure precautions. The second injection was given at 3rd week and 3rd injection at 6th week, and these patients were followed up till 12 months. At each follow-up WOMAC score and VAS scores were evaluated. Paired‘t’ test was applied to evaluate the change in mean WOMAC and VAS scores at each follow-up. A ‘p’ value of < 0.05 was taken as statistically significant.

Result and Conclusion: We had included 40 knees (29 patients) with a mean age of 55.89 ± 9.14 years. Female predominance was seen in our study (75.9%). Only Kellgren-Lawrence osteoarthritis grades I, II and III were included and Grade IV were excluded. The left knee involvement (52.5%) was slightly higher in comparison to the right knee. The mean WOMAC score preinjection was 75.65 ± 5.54, at 3 weeks it was 66.23 ± 6.95 and at 6 weeks and 43.93 ± 14.11 at 6 months. There was a significant improvement (P<0.05) in WOMAC scores over the follow-up till 6 months. The mean WOMAC score along with its 3 subscales showed significant deterioration at 12 months in comparison to 6 months, scores (P<0.05). Likewise, the mean VAS preinjection was 7.18 ± 0.93, which significantly decreased at postinjection (at 6 months) to 3.90 ± 1.19 (P<0.05), but by 12 months the mean VAS showed significant increase to 6.38 ± 1.01 (P<0.05). No major complications were noted, except for pain and swelling at the site

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of injection. These were managed conservatively and responded well to the given treatment.

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Introduction:-

Osteoarthritis (OA) is a progressive, degenerative disease of synovial joints, which results from imbalance between cartilage regeneration and degeneration with a net cartilage loss. It leads to softening and disintegration of the articular cartilage, bone hypertrophy, formation of cyst and subchondral bone sclerosis.[1] The osseous outgrowths known as osteophytes cause pain, deformity and gradually impairs the joint function.[2]

In 1961, Kellgren termed this condition as "osteoarthrosis" as in uncomplicated conditions, synovial thickening or inflammatory infiltration is not seen. Association with systemic illness is not seen in osteoarthritis. OA is more common in weight-bearing joints like knee, hips and the spine. Prevalence in higher body mass index is more. OA is the eighth leading non-fatal burden of disease worldwide and a major cause of disability.[3] It's prevalence in women (18%) is more compared to males (9.6%) over 60 years of age.[3] Though 40% people of aged more than 40 years show evidence of osteoarthritis on radiograph, nearly 50% of them have symptoms suggestive of OA. [2]. The incidence of OA increases with age and nearly 80% of the people of age more than 55 years are affected by it.[4] Improved medical care leading to increased longevity further adds to the burden of osteoarthritis.[5] Obesity and high impact activities such as sports affects the middle and old age adults, increasing the risk of OA in them.[5]

In India, the incidence of osteoarthritis is nearly 5.78%, contributing to approximately 30% of all rheumatological problems seen. Contrary to the belief, its prevalence in India is higher as compared to western countries. The prevalence of symptomatic osteoarthritis (pain during most days of the month with radiological evidence) being around 22 to 39%.[5] Uneven loading on the joints causes osteoarthritis and may affect the joint. Though it sometimes presents with inflammation, this disorder is essentially non-inflammatory.

Trauma, obesity, tuberculosis, subchondral necrosis of bone, gout, rheumatoid arthritis, etc. are a few predisposing factors for secondary osteoarthritis of the knees. Age, sex, ethnicity, genetic predisposition, trauma, joint loading, obesity, hormonal status, bone density, metabolic and nutritional factors, failure of joint protective mechanisms are the risk factors associated with the development of osteoarthritis of the knee.[4]

The diagnosis of osteoarthritis of knees is done using radiographs of the joint, joint fluid analysis and blood tests to rule out inflammatory arthritis. The osteoarthritis knee is graded according to Kellgren and Lawrence classification and graded as Grade I to Grade IV, with Grade I being mild osteoarthritis and Grade IV being severe osteoarthritis.[6]

The management of knee osteoarthritis mainly revolves around the management of pain and improvement in the function of the joint. Till now there is no effective treatment to treat the root cause of the disease. Physical exercises and medications such as Acetaminophen, non-steroidal anti-inflammatory drugs, intra-articular injections of steroid have been found to be effective in delaying the inevitable. Unfortunately, once the disease reaches Grade IV or when the medications and physical therapy is unable to contain the pain and improve the function of the joint, then surgeries such as total knee arthroplasty and high tibial osteotomy are the only option left, with its own risks and complications.

Platelet rich plasma is in clinical practice since 1987, when it was used for the first time in open heart surgery. It was in 2003, for the first time Sanchez et al. used autologous growth factor rich plasma in the treatment of musculoskeletal disorder. Platelet rich plasma (PRP) helps in improving the pain in patients with osteoarthritis.[7]

Platelet rich plasma contains nearly 5-10 times the quantity of platelets in normal plasma. Increasing the concentration of platelets leads to the increase in the growth factors.[8] It is this increase in growth factors which speeds up the healing process. Some tendinopathies have shown improved outcomes with the use of PRP injections and additionally a metaanalysis has shown the efficacy of PRP in the treatment of mild to moderate knee osteoarthritis.[8]

Considering the benefits of platelet rich plasma in alleviation of pain and improvement in the functional outcome in patients with knee osteoarthritis, we undertook the study at our institution with the objectives of finding out the efficacy and functional outcome in patients with osteoarthritis of knee treated with platelet rich plasma, with special reference to patients with Kellgren-Lawrence Grades I, II and III and to find out the complications of the procedure.

Materials & Methods:-

The present study was conducted in the Department of Orthopaedics & Traumatology, Arihant Hospital and Research Center, Indore (M.P.).The present study is a prospective, observational study

Inclusion Criteria

1. Patient of age more than 35 years of any gender.
2. Patient with clinical diagnosis of Primary Osteoarthritis grade 1, 2, 3 based on grading of Kellgren and Lawrence system with symptoms for more than 3 months.
3. Patient not responding to the oral medications for knee osteoarthritis.
4. Patient and/or his/her legally acceptable representative willing to provide their voluntary written informed consent to participate in the study.

Exclusion Criteria

1. Patient who had received intraarticular cortisone injection or presently on oral or systemic corticosteroid within last 6 weeks.
2. Patient on any anticoagulant therapy.
3. Patient with inflammatory arthritis.
4. Patient with associated knee instability.
5. Patient with any sign of infection in or near the knee joint.
6. Pregnant or breastfeeding patients.
7. Patients with surgical intervention on knee or periarticular area within 3 month.
8. Uncontrolled Diabetes with HBA1c >7.5.
9. Patient and/or his/her legally acceptable representative not willing to provide their voluntary written informed consent to participate in the study.

Methodology:-

Pre-Injection Assessment:

The study details were provided to the patient and/or his/her legally acceptable representative in their own language including the risks/benefits, the procedure being performed, complications, and follow-ups. After obtaining their verbal consent to participate, a voluntary written informed consent was obtained from them. All the study related procedures were initiated after obtaining their voluntary written informed consent. Detailed history of the patients was elicited. History of knee pain especially worse while walking was taken. Any history of trauma to knee was inquired and if the symptoms were due to any trauma, those patients were excluded. Clinical examination: Tenderness at medial/lateral aspect of joint line of knee was elicited. Any deformity if present noticed and those patients were excluded from the study. Duration of symptoms and various treatments that the patient had previously taken were inquired in detail. Pain relief and patient satisfaction of the patient with previous treatment assessed. Diagnosis was confirmed clinically.

Hematological investigations:

All the patients underwent investigations which included viral markers (HIV, HBsAg), complete blood count, platelet count, a total and differential leucocyte count and random blood sugars were done. To rule out hyperuricemia, serum uric acid test was also done.

Radiological investigations:

Every patient was subjected to AP, Lateral weight bearing and Patellofemoral Skyline View radiograph of knee.

X-ray findings:

A note of osteophytes with decreased medial joint line space was made. Varus/valgus deformity evaluation was done. Any other abnormal bony structure if present in radiograph in patient, those patients was excluded.







Centrifugation tubes with blood filled tubes in situ

Results:-

9 (31.0%) patients were in the age group 40-50 years, 12 (41.4%) patients were in the age group 51-60 years, 6 (20.7%) patients were in the age group 61-70 years and 2 (6.9%) patients were in the age group more than 70 years.

Majority of the patients were in the age group 51-60 years. The mean age of the patients was 55.89 ± 9.14 years with a range from 40 years to 75 years.

There were 22 (75.9%) patients were females and 7 (24.1%) patients were males. There was a female predominance in the study with a male: female ratio of 1: 3.14.

Of the 29 patients, 11 patients had bilateral involvement and rest 18 patients had unilateral involvement, so total knees involved are 40. Of these 40 knees, left knee involvement was seen in 21 (52.5%) patients and right knee involvement was seen in 19 (47.5%) patients. There was a slight predominance of left knee.

The WOMAC score at preinjection time was 75.65 ± 5.54 and at 3 weeks it was 66.23 ± 6.95. The difference was found to be statistically significant (P=0.001), showing a significant reduction in the mean WOMAC score at 3 weeks in comparison to the preinjection time. The WOMAC score at 3 weeks was 66.23 ± 6.95 and at 6 weeks it was 55.20 ± 10.52. The difference was found to be statistically significant (P=0.001), showing a significant reduction in the mean WOMAC score at 6 weeks in comparison to 3 weeks.

The WOMAC score at 6 weeks was 55.20 ± 10.52 and at 6 months it was 43.93 ± 14.11. The difference was found to be statistically significant (P=0.001), showing a significant reduction in the mean WOMAC score at 6 months in comparison to 6 weeks.

The WOMAC score at 6 months was 43.93 ± 14.11 and at 12 months it was 71.60 ± 6.03. The difference was found to be statistically significant (P=0.001), showing a significant increase in the mean WOMAC score at 12 months in comparison to 6 months.

There was a significant reduction in WOMAC score till 6 months of follow-up (P<0.05), but WOMAC score significantly increased at 12 months follow-up (P<0.05) in comparison to 6 months.

The overall WOMAC score improved till 6 months, but significantly it increased at 12 months.

The mean preinjection VAS was 7.18 ± 0.93 and the postinjection (at 6 months) VAS was 3.90 ± 1.19. The difference was found to be statistically significant (P=0.001), showing a significantly lower VAS after injection in comparison of VAS before injection.

The mean postinjection (at 6 months) VAS was 3.90 ± 1.19 at 12 months it was 6.38 ± 1.01. The difference was found to be statistically significant (P=0.001), showing a significantly higher VAS at 12 months in comparison of postinjection (at 6 months) VAS.

The VAS initially reduced by postinjection (at 6 months) and then again rises at 12 months. The pain was contained till postinjection (at 6 months) and then again became worse.

Discussion:-

Osteoarthritis is a progressive degenerative disease of the synovial joints. The etiology of osteoarthritis being the cartilage degeneration, with the increase in the age the cartilage regeneration is reduced and cartilage degeneration continuously happens leading to complete destruction, though very slowly. Initially management involved non-steroidal anti-inflammatory drugs, intra-articular glucocorticoid injection or injection with hyaluronic acid. When these medical managements and lifestyle changes fail contain the pain occurring due to osteoarthritis, and then the last resort is total knee arthroplasty. The pain experienced by these patients is very severe and debilitating. Due to the severity of pain, these patients sometimes restrict their movements and lead a life within a small area of a home. Prevalence of osteoarthritis is seen more commonly in women in comparison to the males [2] and is typically seen in patients of age more than 40 years.[5]

Platelet rich plasma (PRP) has shown benefits in many fields of medicine. This is a preparation done from autologous blood of the patient. PRP contains many growth factors and cytokines and they help in the healing process. Inflammatory, proliferative and maturation are the three phases of healing in patients who are given PRP. Recently due to the beneficial effects seen in patients who were treated with lateral epicondylitis and plantar fasciitis, interest has grown in the treatment of knee osteoarthritis using PRP.

The cytokines present in the PRP have shown to modifying the processes such as cell migration, angiogenesis and collagen synthesis; and finally wound healing.

In the present study we had included 29 patients of osteoarthritis and studied the effectiveness of platelet rich plasma injection in pain relief and functional improvement in these patients. Pain relief was evaluated using Visual Analogue Scale (VAS) and WOMAC scores. We had excluded Grade IV osteoarthritis of knee patients and patients with Grade I, II and III were included.

Majority of the patients were in the age group 51-60 years with a mean of 55.89 ± 9.14 years (range: from 40 years to 75 years) with a female predominance (22 vs. 7 males). **Sucuoğlu et al (2019)[*]** in their study also had a female predominance.**Raeissadat et al (2021)[*]** study patients had a mean age of 56.9 ± 6.3 years with a female predominance (69.5%). Our study results are comparable with the studies done by Sucuoğlu and Raeissadat**.**

A total of 40 knees from 29 patients were included in the study. Both the left and right knees involvement was similar with a slightly higher prevalence of left knee.

The preoperative WOMAC score was 75.65 ± 5.54, at 3 weeks it was 66.23 ± 6.95, at 6 weeks it was 55.20 ± 10.52 and at 6 months it was 43.93 ± 14.11. There was a significant improvement in mean WOMAC score at each follow-up (P<0.05).

Filardo et al (2020)[*] found a significant improvement in the mean WOMAC score in PRP group in comparison to placebo group (P=0.02) at 12 months and also was better than hyaluronic acid at both 6 and 12 months (P<0.001).

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