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Assessment of Platelet Rich Plasma (PRP) In the Treatment of Primary Osteoarthritis Knee: An Original Research

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Abstract

Introduction: The present therapeutic line of osteoarthritis of knee is primarily symptomatic, therefore the need to discover treatment modality which tackles the disease process in itself. This study was done with an intention to examine the efficacy of platelet rich plasma in primary osteoarthritis of knee.

Materials and Methods: This prospective investigation was done on 100 knees in 100 individuals having early primary osteoarthritis of the knee. Three injections of platelet rich plasma were administered at four weeks interval and the outcome was analyzed by WOMAC and VAS score at pre injection, 3 weeks, 12 weeks and 24 weeks. Ahlback's grading was done at pre-injection and at 6 months.

Results: Most of the cases in our series were in the age category of 50-65 years with female predominance (73%), 51% cases had grade 2 disease and the remaining had grade 1 involvement. Improvement in WOMAC score parameters started after 3 weeks with continuing improvement at successive follow-ups. WOMAC score parameters (pain, stiffness, physical function and total score) at pre injection were 14.22, 5.05, 36.41and 55.8 and at 6 months follow up were 5.92, 2.07, 16.78 and 24.11 correspondingly. Similar improvement was noted in VAS score with pre injection score of 7.12 and final score of 2.96. The average WOMAC score was less for grade 1 as compared to grade 2 (43.42 vs 60.41); (43.63 vs 61.36). Improvement was reported in 86% of patients however the level varied from good to slight improvement. There was no problem associated to the treatment in our series.

Conclusion: The initial data show that PRP is an effective therapeutic strategy in early grades of primary Osteoarthritis of knee. However, further strong evidence Research is required to check for the long-term impacts and to corroborate the conclusions of this investigation.

Keywords: Platelet rich plasma, osteoarthritis, intra articular injection, PRP in knee.

Introduction

The most common type of arthritis is osteoarthritis (OA), which is also the leading cause of disability in persons aged 65 and older. [1] It is a disease with a diverse clinical presentation that is not well understood. In spite of the fact that the vast majority of studies has focused on the deterioration of cartilage, arthritis is frequently now thought of in terms of organ failure. [2] The management techniques that are currently accessible, while primarily relieving symptoms, do not generally address the illness process itself and are hence limited in their

effectiveness. Recent research has focused on the use of growth factors and autologous platelet-rich plasma (PRP) as a potential treatment option to speed up the healing process of chondral injuries and alter the progression of early degenerative arthritis. The physiological function of platelets in the healing process provided the foundation for the idea that using PRP could speed up cartilage regeneration after damage. Platelets include around 1500 different proteins, some of which are growth factors such as PDGF, VEGF, TGF-beta, FGF, and EGF, which are known to play an important part in the natural process of healing. Platelets also contain other proteins that are not growth factors. [3,4]

Notwithstanding the progress that has been made in surgical procedures and techniques, finding the appropriate treatment for cartilage injury continues to be a clinical issue. Although in light of encouraging preclinical findings and a growing interest in the clinical application of PRP, the majority of problems about this topic still have not been resolved.

Materials and Methods

After obtaining an informed written agreement and staging the patients according to Ahlback's radiological grading [5], this prospective study was carried out on hundred patients who were diagnosed with primary early OA at a tertiary care center in the southern part of India. A total of 100 knees were examined because seven patients had been found to have involvement in both of their knees. Patients who had Grade 1 or Grade 2 illness, were between the ages of 35 and 70, and had no history of receiving an intra-articular injection in the preceding three months were eligible for participation in the trial. Platelet-rich plasma was produced by centrifuging 100 milliliters of the patient's venous blood that had been collected in a 100 milliliter bag using the anticoagulant CPD-A (Citrate Phosphate Dextrose and Adenine). Following the transfer of the blood into two 50 ml tubes, it was spun on a table top centrifuge for fifteen minutes at a speed of one thousand five hundred revolutions per minute. Platelet-rich plasma, often known as PRP, and leftover red blood cells, along with the buffy coat, were isolated from the blood. The platelet-rich plasma was collected using a pipette, and then it was placed in a test tube. After that, an injection of 8 milliliters was prepared and placed in a syringe for administration into one of the knees. The platelet concentrate was injected using a lateral approach with a needle that was between 18 and 20 gauges. The patients received a total of three injections spaced out over a period of four weeks. The VAS [6] and WOMAC [7] scores were used to conduct an evaluation both before and after the injection at three weeks, three months, and six months after the injection. Where it was possible, Ahlback's grading was completed at the six-month mark.

Results

There were a total of hundred patients; with 73% were women and twenty seven men. 43 percent of the patients were in the age bracket of 50 to 65 years old, making up the majority of the patient population. 51 knees revealed grade 2 disease whereas grade 1 disease was found in 23 knees. The breakdown of patients according to their ages and genders may be found in table 1.

We looked at both the individual mean WOMAC scores as well as the overall mean WOMAC scores. The first signs of an improvement in symptoms appeared after three weeks, and they continued to get better with each successive follow-up, as demonstrated by the p value of 0.000 and the drop in the mean values presented in table 2.

The VAS score dropped from 7.12 ±2.01 before the injection to 6.25±2.06, 4.04±1.69 and 2.96±1.37 throughout the following follow-ups that occurred up until 6 months after the injection. There was a discernible and substantial rise in quality as measured by statistics (p value 0.000). (Table 3).

The calculation of the mean Total WOMAC score based on Ahlback's grading done at pre injection and third follow up was done, and it was

discovered that the mean Total WOMAC score for grade 1 osteoarthritis was lower compared to the score for grade 2 osteoarthritis. Twenty-one patients experienced mild discomfort, and two patients experienced considerable pain, both of which improved on their own over the course of the next few days. One patient went through an episode that involved perspiration and a rapid heart rate. There were no major complications that arose during this process. At the end of the first six months, the patient was questioned about their level of improvement. Eighty six patients, representing an 86% improvement rate, demonstrated some level of improvement, ranging from slight to significant improvement. (Table 4).

Table 1: Age and sex distribution of patients.

Age (in years)	Females	Males	Total (%)
<40	10		10
41-50	23	6	29
51-60	32	17	49
61-70	8	4	12
Total	73	27	100

Table 2: WOMAC score (mean) at pre-injection, 3 weeks, 3 months and 6 months interval

Parameters	Pre injection	First follow up	Second follow up	Third follow up
Pain	14.22±2.63	14.01±3.69	8.91±2.11	5.92±3.19
Stiffness	5.05±1.96	4.01±1.25	3.12±1.42	2.07±1.51
Physical function	36.41±8.88	34.99±8.88	23.72±9.75	16.78±8.46
Total	55.80±10.09	51.36±11.54	34.69±9.11	24.11±12.48

Table 3: VAS score means with time

VAS score	Mean ±SD
Pre injection	7.12 ±2.01
1st follow up	6.25±2.06
2nd follow up	4.04±1.69
3rd follow up	2.96±1.37

Table 4: Status of improvement in patients at six months.

Number of knees (N=100)	Satisfaction
30 (20%)	Good improvement
26 (26%)	Moderate improvement
30 (30%)	Mild improvement
16 (16%)	No improvement
-	Worsened

Discussion

The use of PRP in primary osteoarthritis of the knee has only been the subject of a small number of studies in the existing body of research. On the other hand, the data that are available do not follow any consistent standards. As a consequence of this, the data to support the clinical use of PRP as a therapy modality in primary osteoarthritis of the knee is inconclusive at best. The patients in our study ranged in age

from 35 to 70 years old. Filardo et al [8] and Patel et al [9] both came to the same conclusions, but in the study carried out by Sanchez et al [10], the average age of the patients was calculated to be 63.53 years old. This was due to the fact that the researchers included patients who had advanced stages of osteoarthritis in their research.

In our research, we found that women were more likely to participate, which is consistent with the findings of prior studies. [7,8] On the other hand, Kon et al.[11] and Sampson et al.[12] found that male participants predominated in their respective studies.

There was an unmistakable connection between Ahlback's grading and our experiences. When compared to grade 2, the total WOMAC score for grade 1 students was lower at both the baseline and the third follow-up assessment. Researchers Kon et al [11] came to the conclusion that younger patients with a lower degree of degenerative chondropathy achieved better results than patients affected by early osteoarthritis, who in turn exhibited higher improvement than patients with advanced osteoarthritis. Patel et al.[9] found an association with Ahlback's grading that was quite comparable in both group A and group B. They found that grade 1 knees had lower mean pain and other WOMAC scores than grade 2 knees (P = 0.016 for group A and P = 0.005 for group B).

Both the WOMAC and the VAS score assessment showed similar tendencies, with pain being the most bothersome of the symptoms. The degree to which the patient's pain lessened at the initial follow-up was comparable to that found in previous published literature. However, an analysis of published data showed a worsening in symptoms at the final follow-up period of six months. This raises the question of whether or not the effect of PRP is temporary, whether or not it has the ability to modify the disease process, or whether or not repeated injections are necessary for long-term relief. This is an issue that has not been satisfactorily answered, and additional research and investigation are needed to demonstrate the same.

Patel et al.[9] had 67.3% satisfied patients in group A and 64% satisfied patients in group B at 6 month follow-up, in contrast to the control group, in which only 4.3% of the patients were satisfied. Sanchez et al.[10] observed a success rate of 33.3% at week 5 in their study. Kon et al.[11] reported that 80% of their patients were happy with their treatment. Although the level of improvement ranged from significant improvement to slight improvement, we found an overall improvement of 86 percent.

The administration of platelet-rich plasma has not been associated with any major adverse effects in any of the studies that have come before it that have been published. Our research came to the same conclusions as the previous one. The most significant problem was some mild discomfort, which was most likely brought on by an interventional technique as well as the body's normal reaction to inflammatory mediators.

We hypothesize that platelet-rich plasma might play a part in the treatment of osteoarthritis, a hypothesis that is supported by the fact that the VAS and WOMAC scores of the patients in our study improved during the short-term follow-up period. It is unlikely that chondral remodeling was the cause of the improvement seen in our research because this enhancement could be attributable to anti-inflammatory qualities or the release of a number of different growth factors. If chondral remodeling was the reason for the improvement in symptoms, the advantage would have started later and would have lasted for a longer duration. Nevertheless, in order to comment on the same in our investigation, lengthier follow up is required. In addition, high-quality studies with an extended follow-up period are necessary in order to determine whether or not the effect of PRP is fleeting or whether or not it can actually alter the progression of the disease.

We were only able to employ the WOMAC and VAS scores as evaluation parameters for this study due to the fact that pain was the primary presenting symptom. This was a limitation of both the time period and the evaluation

parameters. Another disadvantage was that there was no indication that cartilage regeneration had taken place because there were no follow-up studies performed other than X-rays, which are not sensitive enough to document the change if there is any cartilage regeneration.

Conclusion

PRP appears to be an effective therapeutic option for early grades of primary osteoarthritis of the knee at short term follow up, which leads us to the conclusion that this treatment should be further investigated. However, in order to confirm its effectiveness on longer follow up and in later stages of OA cases, further evidence-based studies of a high quality are necessary to be conducted.

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