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PLATELET-RICH PLASMA (PRP) THERAPY FOR KNEE ARTHRITIS IN A TERTIARY CARE TEACHING HOSPITAL STUDY

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Abstract

Background: In cases of early osteoarthritis (OA) of the knee, platelet-rich plasma (PRP), a concentration of autologous blood growth factors, has been demonstrated to offer some clinical alleviation. **Materials and Methods:**This is a prospective study and it was carried out on 25 patients 06 (24.0%) males & 19 (76.0%) females in the Department of Orthopedics', World College of Medical Sciences & Research, Gurawar, Jhajjar. AGE >40 years, Knee arthralgia (>3 months) and Radiologic evidence of articular damage (grades I-III of Kellgren-Lawrence scale) based on knee Osteoarthritis criteria of American College of Rheumatology were enrolled in our study. **Result:** The average scores for every WOMAC criterion increased dramatically after treatment. At each follow-up, the WOMAC Score's individual parameters were compared to the baseline score. During the first (3 weeks) and second (6 weeks) follow-ups, there was a reduction in the mean pain, mean physical function, and mean total womac scores compared to the baseline scores. There was then a slight increase in scores during the third (3 months) and fourth (6 months) follow-ups, but the mean differences between these scores were all statistically significant. **Conclusion:** These finding shows that the intra-articular injections of autologous platelet rich plasma (PRP) in early knee osteoarthritis are successful in lowering joint pain and stiffness and improving knee functioning.

INTRODUCTION

Osteoarthritis (OA) is a major contributor to disability and is associated with twice as many visits to primary care doctors as it is without.[1] Of all the joints, OA affects the knee the most.[2] The number of surgical treatments for knee OA will rise considerably in the coming years as the population ages and the obesity pandemic spreads, with knee replacement being the most expensive for the healthcare system and burdensome for patients. It would be really beneficial to have other therapy options for knee OA. Osteoarthritis is a degenerative condition of the synovial joints brought on by articular cartilage breakdown. There are several techniques for easing knee osteoarthritis (OA) patients' symptoms, but none of them can be regarded as the best treatment for osteoarthritis because they cannot change the course of the illness.[3,4] Due to the different growth factors that

are kept in the platelet granules of platelets, such as Transforming Growth Factor (TGF), Platelet Derived Growth Factor (PDGF), Insulin-like Growth Factor (IGF), etc., Platelet Rich Plasma (PRP) has recently become a therapy option for knee OA. The effects of PRP on knee OA are the subject of numerous ongoing investigations. In these investigations, patients' symptoms and functional abilities considerably improved following the customary 2-3 cycles of injections spaced by 2-3 weeks.[5,6] Regarding the quantity of injections, the interval between injections, and the duration of PRP effects, there is still disagreement.[7,8,9] In the current study, we assessed the effects of two PRP injection courses spaced three weeks apart on the patients' functional capacity and quality of life.

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MATERIALS AND METHODS

This prospective study was conducted on 25 patients between May, 2021 and June, 2022 at the Department of Orthopedics, World College of Medical Sciences & Research, Gurawar, Jhajjar, with 6 (24.0%) males and 19 (76.0%) females. The American College of Rheumatology's knee osteoarthritis criterion, age >40 years, knee arthralgia (>3 months), and radiologic evidence of articular destruction (grades I-III of Kellgren-Lawrence scale) were the inclusion criteria for our study. Participants who refused to participate in the trial, those with secondary osteoarthritis, people with severe cardiovascular diseases, immune system problems, cancer, infections or open wounds on the knee, and people with tensed joint effusions were also excluded. The included patients' BMI was not taken into account.

Approach to Recruitment

Orthopedics OPD was used to source patients. Positive exclusion criterion signs were checked on all of the chosen patients. Patients who met the requirements for inclusion were asked to complete the WOMAC questionnaire. The worst afflicted knee joint according to the WOMAC score (higher score) was chosen for patients with osteoarthritis of both knee joints, and the same affected knee joint was chosen for patients with osteoarthritis of just one knee joint. A straightforward radiograph of the chosen knee joint was taken (standing Anteroposterior and lateral view).

Platelet Rich Plasma (PRP) Preparation: The patient's antecubital vein was used to take about 27 ml of venous blood, which was then collected in three 10 ml vaccutainer bottles and contained 1 ml of 3.2% sodium citrate as an anticoagulant. The orthopaedic O.P.D. collected the sample, which was sent to the pathology lab for PRP production. The sample was then spun in two stages, once at 100 g for 10 minutes and once at 400 g for 10 minutes, using the Remi 8c centrifuge model. With the use of the formula RCF (Relative Centrifugal Force) or G Force = 1.12 x Radius (mm) x (rpm/1000)2 and a radius of 116.6mm, it was possible to determine that 875rpm were needed for 100g force and 1750rpm were needed for 400g force. The upper layer above the buffy coat layer was collected and transferred to empty tubes after the initial centrifugation, which took place at 100g (876rpm) for 10 minutes. For an additional ten minutes, these tubes were centrifuged at 400g (1750 rpm). Following this, the upper third of the fluid was discarded, and the lower two thirds were collected as platelet rich plasma (PRP). On the same day, the afflicted knee received an intra-articular injection of the final product—5–6 ml of PRP. In the beginning, all of the patients' whole blood and PRP had their platelet counts evaluated. Both the whole blood and the PRP had mean platelet counts of 241,000/l and 1,019,000/l, respectively.

Intervention Technique

The patient was transferred to Minor O.T. once written, informed consent was obtained. The patient was positioned supine. Under aseptic conditions, 4-5 ml of PRP were injected into the knee via a supralateral route with a 22-gauge needle without the use of local anaesthetic since they may be toxic to chondrocytes and may alter the pH of the knee's environment, which may affect platelet activation. There was no use of an external agent to activate platelets. The bandage served as an aseptic dressing. The knee was repeatedly flexed and stretched after PRP injection. Following PRP injections, no NSAIDs were prescribed to the patients.

Follow up

Platelet Rich Plasma (PRP) was injected into the joints twice, three weeks apart, and the patient underwent routine checkups three and six weeks, three and six months after the initial injection.

Outcome Measures: Using the WOMAC questionnaire, assessments were performed at each visit.

Analytical Statistics

SPSS software version 20.0 was used to evaluate the data that was obtained. All demographic information was presented as mean SD. Data on the severity of every condition was expressed as a frequency. For follow-up from the baseline to the third week, sixth week, third month, and sixth month, a paired sample T-test was utilised. Statistics are considered significant when the P- value is less than 0.05.

RESULTS

Participants' enrollment and initial characteristics: Male to female ratio was 6:19 (1:3.2), mean BMI was 25.6±4.06 (kg/m2), and mean age was 56.24±9.62 years. In K-L Grade I, there were four (16.0%) cases identified, seven (28.0%) cases distributed in Grade II, and fourteen (56.0%) cases distributed among patients with osteoarthritis in Grade III. The average scores for every WOMAC criterion increased dramatically after treatment. At each follow-up, the WOMAC Score's individual parameters were compared to the baseline score.
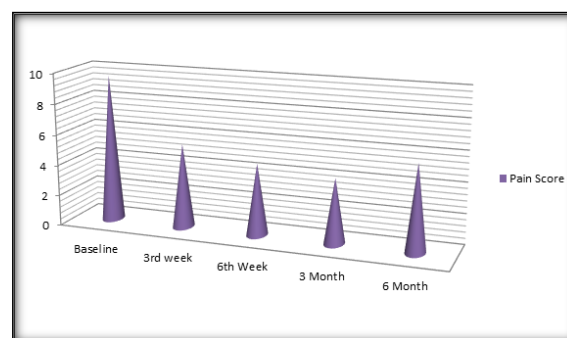

Figure 1: Bar Graph for Pain Score: The figure above depicts the mean Pain score's decline from the baseline over the course of the first and second follow-ups, followed by a slight increase during the third and fourth follow-ups

Table 1: Baseline evaluation of study participants

Variables		No. of patients (%)
Age in years Range		(Mean ± SD) 56.24 ± 9.62 40 - 82
Gender	Male	06 (24.0%)
	Female	19 (76.0%)
BMI (kg/m2) Range		(Mean ± SD) 25.6 ± 4.06 21.4 – 29.6
Side	Left	11 (44.0%)
	Right	14 (56.0%)
Kellgren-Lawrence Grade	Grade I	04 (16.0%)
	Grade II	07 (28.0%)
	Grade III	14 (56.0%)

During the first (3 weeks) and second (6 weeks) follow-ups, there was a reduction in the mean pain, mean physical function, and mean total WOMAC scores compared to the baseline scores. There was then a slight increase in scores during the third (3 months) and fourth (6 months) follow-ups, but the difference in the mean of all the scores was significant compared to the corresponding baseline scores. On each successive follow-up, patients reported a consistent decrease in stiffness.

Table 2: Outcomes measures at baseline, follow-up (4) and change from baseline

WOMAC Variables	0	1st	2nd	3rd	4th
Pain	9.6±3.2	5.46±2.6	4.65±2.32	4.21±2.21	5.62±2.32
P value	0	<0.01	<0.01	<0.01	<0.01
stiffness	3.27±0.62	2.41±1.04	2.26±0.54	1.76±2.6	1.74±0.92
P-value	0	<0.02	0.03	<0.01	<0.01
Physical function	36.21±16.04	21.03±9.21	15.54±2.85	16.62±4.78	19.67±6.61
P-value	0	<0.01	<0.01	<0.01	<0.01
Total score	48.52±18.25	29.52±8.26	21.73±13.59	23.35±13.02	28.42±14.06
P-value	0	<0.02	<0.04	<0.01	<0.02

{* 0 = Baseline, 1st = Week 3rd, 2nd = Week 6th, 3rd = 3rd month, 4th = 6th month. *P value paired with baseline. *A reduction in pain scores indicates improvement. #An increase in quality of life score indicates improvement.}.

DISCUSSION

One of the most frequent chronic joint diseases is osteoarthritis (OA).[10] Osteoarthritis has traditionally been managed with symptomatic treatments. Treatment for osteoarthritis aims to reduce discomfort and enhance functional status. Platelet count in PRP is four to five times higher than average.[11] The goal of the current study is to ascertain whether the encouraging outcomes attained at 6 months were sustained over time and to ascertain whether there were significant differences between the findings at the 3rd week, 6th week, 3rd month, and 6th month follow-up weeks. Application of GF-rich PRP was shown by Sanchez et al.[12] to be more effective at managing pain than hyaluronic acid injections. PRP injections are beneficial in lowering pain in osteoarthritic knee joints, according to earlier research by Kon E. et al.[13] Say F. et al.[14] and Spakova T. et al.[15] At the six-month follow-up, 261 patients with unilateral or bilateral knee OA reported improved WOMAC, VAS, Lequesne Index, and Short Form-36 scores, according to Wang-Saegusa et al.[16] In patients with knee OA, Chang et al.[17] found that PRP treatments were more successful than hyaluronic acid administration. ACP (Autologous Conditioned Plasma) was utilised by Cerzaet al.[18] to treat knee OA. Their findings show that ACP results in greater functional improvement. The current study also found that PRP administration improves clinical results and discomfort when compared to the follow-up before therapy. WOMAC ratings considerably increased with relation to the symptomatic and functional recovery six months following PRP administration, these results were significant. At each follow-up, the WOMAC Score's individual parameters were compared to the baseline score. During the first and second follow-ups, improvements in the mean pain, mean physical function, and mean total womac scores were seen compared to the baseline scores; nevertheless, the mean of all scores differed significantly from the corresponding baseline scores by the third and fourth follow-ups. On each successive follow-up, patients reported a consistent decrease in stiffness.

CONCLUSION

These results imply that platelet-rich plasma treatment is a straightforward, inexpensive, and minimally invasive intervention that can be administered in primary care to treat degenerative lesions of the knee's articular cartilage. According to the findings of the current study, intra-articular knee injections of autologous platelet rich plasma (PRP)

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are beneficial in easing joint pain and stiffness and enhancing knee functions in people with early-stage osteoarthritis of the knee. However, the slight increase in WOMAC parameters at the third and fourth follow-ups compared to the first and second follow-ups suggests that PRP injections for knee osteoarthritis are only effective in the short term, and the positive benefits tend to fade over time.

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