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Evaluation of the efficacy of Intra-articular Platelet rich plasma in Osteoarthritis knee

Medical Science

KEYWORDS :

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Introduction

Osteoarthritis(OA) is the second most common rheumatological problem and is most frequent joint disease with prevalence of 22% to 39% in India (1-3). This is the most common cause of locomotor disability in the elderly. It is a chronic degenerative disorder of multifactorial etiology characterized by loss of articular cartilage, hypertrophy of bone at the margins, subchondral sclerosis and range of biochemical and morphological alterations of the synovial membrane and joint capsule (4). In recent years intra- articular infiltrations of platelet rich plasma (PRP) have emerged as an alternative to current treatments. This biological therapy uses patient's own platelets and plasma, which mainly convey fibrin and growth factors as effectors. These growth factors act on entire joint and may well have an influence on the development of OA, they promote restoration of joint homeostasis, have inductive and protective effects on chondrocytes, and stimulate the production of hyaluronic acid by synoviocytes. All these properties help to promote a generative biological environment and to slow down joint and cartilage degeneration, thereby relieving symptomatology (5).In almost all published studies, PRP has been shown to have a strong positive effect on chondrocyte proliferation in vitro. There is, however, less concordance in the effect of PRP on chondrocyte differentiation.PRP has also been demonstrated recently to have anti-inflammation potential in an osteoarthritic milieu (6). Since platelets aggregate along the fibrin fibers during clotting, the resultant three-dimensional scaffold can also act as a reservoir of growth factors that exert favorable effects on cells (7). Platelet rich plasma (PRP) therapy is a simple, low cost and minimally invasive method that provides a natural concentrate of autologous blood growth factors (GFs) that can be used to enhance tissue regeneration. This therapy is widely experimented in different fields of medicine to test its potential to enhance tissue regeneration (8).

Materials & Methods

Research Design

This was a single group Observational Study where autologous PRP was administered in patients at 2 intervals (1st and 14th day). After institutional ethics board clearance, volunteer participants were subjected to a standardized injection protocol and were assessed on a number of variables (Western Ontario and McMaster Universities Arthritis Index [WOMAC] scoring, visual analog scale [VAS] for pain, satisfaction, and adverse effects) before the treatment and at 3 times after treatment (at 6 weeks, 12 weeks and 24 weeks) by a blinded observer.

Sample and Sampling

Inclusion Criteria - 54 patients above 40 years with bilateral early OA of the knee were selected. Kellgren-Lawrence grade II and III knees without significant deformity in patients who volunteered and signed a detailed informed consent form. Exclusion criteria - Systemic disorders like Rheumatoid Arthritis, Gouty Arthritis, Acute infection or inflammation, any bleeding disorder, severe cardiovascular diseases, Immunedepression or patients in therapy with anticoagulants-antiaggregants, use of NSAIDs within 5 days before blood donation, patients with Hb values of <11 and platelets values of 150,000 /cumm, late stage of Osteoarthritis Knee KL Grade IV.Baseline scoring was done using VAS & WOMAC Score and patient was subjected to the procedure which was carried out under aseptic precautions. Procedure - Under full aseptic precautions 5ml of PRP was injected through lateral approach using a 16-g needle. During this period, the use of non-steroidal medication was advised for 3 days and then SOS. Second dose of PRP was given on the 14th day. All the patients were followed up at 6, 12 and 24 weeks and evaluated by VAS and WOMAC score. All results are presented as the number of knees. VAS and WOMAC score was used in clinical evaluation. The patient's satisfaction was also recorded

Statistical Analysis

Evaluation of VAS and WOMAC at four different intervals was done by applying Freidman test. Comparison of VAS and WOMAC groups at different intervals was done by applying Post Hoc test.

Results

In our study out of 54 cases, maximum number of cases 28(51.85%) were in the 40-50 years age group, 16 (29.62%) cases in the 51-60 years age group and 10 (18.51%) in the 61-70 age group. Majority of the 30 (55.55%) cases were females and rest 24 (44.44%) were males. Majority of the cases were Homemakers i.e 26 (48.14%), Manual workers i.e. 16 (29.62%), Office workers i.e. 12 (22.22%) cases respectively.37 (68.51%) cases had complaint of pain for less than one year, where 17 (31.48%) complained of pain for more than one year.38 cases (70.03%), had grade II disease status as per the Kellgren-Lawrence grading scale and 16 cases (29.62%) had grade III disease status. Median of VAS was 7±1 at pre treatment, 6±1.5 at 6 weeks, 5±1.5 at 12 weeks and 4±1.5 at 24 weeks. The values were found to be significant by applying Freidman Test. Median of WOMAC score was 71±14.87 at pre treatment, 62.00±11.50 at 6 weeks, 47±11.87 at 12 weeks and 42.00±15.50 at 24 weeks. The values were found to be significant by applying Freidman Test.On applying Post Hoc Test with Bonferroni correction, median of VAS pre treatment was compared with the median of 1st , 2nd and 3rd follow up subsequently. The median of VAS 1st follow up at 6 weeks was compared with the median of 2nd and 3rd follow up subsequently. The median of VAS 2nd follow up at 12 weeks was compared with the median of 3rd follow up subsequently. The Chi Square-DF of IInd and IIIrd intervals were found to be significant.On applying Post Hoc Test with Bonferroni correction, median of WOMAC pre treatment was compared with the median of 1st, 2nd and 3rd

follow up subsequently. The median of WOMAC 1st follow up at 6 weeks was compared with the median of 2nd and 3rd follow up subsequently. The median of WOAMAC 2nd follow up at 12 weeks was compared with the median of 3rd follow up subsequently. The Chi Square-DF of IInd, IIInd and Vth intervals were found to be significant.

Discussion

In the present study, it was observed that the age distribution of the cases ranged from 40 years to above 70 years, with a maximum number of cases i.e 28 (51.85%) in the age group of 40-50 years. The mean age of the cases was 52.8 ± 7.85 years. These findings were in accordance with the study by Filardo G et al(9), the mean age of cases in their study groups was 53.8 ± 14.9 years and 50.3 ± 14.4 years. In our study we observed a female preponderance, with 30 (55.55%) cases being females. This was in accordance with the study conducted by Patel S et al(10), which also had a female preponderance. In the present study the maximum number of patients were homemakers, being 26 (48.14%) cases followed by physical workers i.e. 16 (29.62%) cases, office workers i.e. 12(22.22%) cases. None of the studies referred took into consideration the profession of the cases included.An overall reduction in pain was observed in all of the evaluated parameters, which were significantly lower at the pre - 24 week follow-up, VAS pre median 7±1 decreasing significantly at 24 weeks interval with a median of 4±1.5 and Chi Square value of 51.00 with significant P value 0.000, WOMAC pre median 71.00±14.87 decreasing significantly at 24 weeks interval with a median of 42.00±15.50 and Chi Square value of 52.00 with significant P value 0.000 when compared to the 6-month evaluation at all intervals applying the Post Hoc test. In fact, despite the overall reduction in all of the subgroups those with a lower degree of cartilage degeneration still presented better results at the last follow up. Finally, the median of clinical improvement was highly significant at pre - 24 weeks interval.

Conclusion

Finally we can conclude that intra articular PRP injections has the potential to reduce pain and improve knee function and quality of life with short-term efficacy, especially in younger patients with chondral degenerative lesions and early osteoarthritis. The effect tends to taper off over time, leaving open the option of staged injections over many months as a potential future therapeutic regimen.

Study Limitations

The primary imperatives of a new therapy remain the control of symptoms; because pain is the most pressing problem in OA, we evaluated only clinical parameters by using the WOMAC and VAS scoring systems. Radio- graphic follow-up investigation methods such as mag- netic resonance imaging may be considered for evaluating cartilage regeneration (if any) in subsequent research efforts; we could not do this because of the cost and ethical issues.

Comparison of WOMAC groupsat different intervals

WOMAC pre-injection	WOMAC 6 week	WOMAC 12 week	WOMAC 24 week	Chi Square	DF	P value
71.00±14.8	62±11.5	47±11.8	42.00±15.5	150.0	3	0.000

	Interval	Chi Square	DF	P Value
Pre-	6 wks	48.00	1	0.000
	12 wks	52.00	1	0.000
	24 wks	52.00	1	0.000
6 wks-	12 wks 24 wks	44.00 52.00	1 1	0.000 0.000
12 wks-	24 wks	44.00	1	0.000

Comparison of VAS groups at different intervals

VAS pre-injection	Vas 6 week	Vas 12 week	VAS 24 week	Chi Square	DF	P value
7±1	6±1.5	5±1.5	4±1.5	137.93	3	0.000

	Interval	Chi Square	DF	P Value
Pre-	6 wks	39.00	1	0.000
	12 wks	51.00	1	0.000
	24 wks	51.00	1	0.000
6 wks-	12 wks 24 wks	38.09 47.07	1 1	0.000 0.000
12 wks-	24 wks	34.00	1	0.000

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