

Efficacy of Single Intra-Articular Injection of Platelets Rich Plasma in Patients with Early Osteoarthritis of Knee Joint

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ABSTRACT

Objective: To evaluate the role and effectiveness of intra-articular platelet rich plasma (PRP) injection for pain management among patients having early osteoarthritis of knee joint.

Methods: All the patients presenting between February 15, 2015 to August 15, 2015 with early osteoarthritis of knee with a pain score of 8 to 10 on visual analogue scale (VAS) were included in the study. All patients were given single intra-articular platelet rich plasma injection. All patients were followed for 12 weeks. The outcome was measured in terms of mean reduction in VAS pain score from the base line.

Results: There were 93 patients with mean age of 49.17 ± 7.993 ranged from 33 to 60 years of age were selected. Thirty eight patients (40.9%) were male, whereas 55 patients (59.1%) were female. Mean reduction in VAS Score was 3.31 ± 1.260 ranged from 1 to 6. Gender, age or duration of disease shown no statistical difference in outcome illustrated.

Conclusion: Present study reveals that patients having early osteoarthritis of knee joints after injecting intra-articular platelet rich plasma injection are efficacious in reducing 50.0% of pain measured of VAS score.

Key Words: Osteoarthritis, Intra-Articular, Platelet Rich Plasma Injection (PRP), Visual analog score (VAS)

INTRODUCTION

Degenerative illness like osteoarthritis is leading cause of impaired mobility and disabilities in elderly [1]. Early Osteoarthritis (OA) of knee is defined as symptoms less than 14 weeks and degenerative changes in hyaline articular cartilage along-with new growth of cartilage and bony remodeling with capsular stretching on X-ray finding [2]. Not only sclerosis in subchondral bone, but mild synovitis and capsular fibrosis occur with musculoskeletal weakness [3]. In some cases, the laxity of the ligaments and inflammation of the synovial membrane may worsen the illness.

Overall, in the United States, OA affects 13.9% of adults aged 25 years and older and 33.6% (12.4 million) of those 65+ in 2005; an estimated 26.9 million US adults in 2005 up from 21 million in 1990 (believed to be conservative estimate). Average annual prevalence of OA in the ambulatory health care system in the United States, from 2001–2005, was estimated to be 3.5%, which amounts to 7.7 million with OA [4,5].

Recently, platelet-rich plasma (PRP), intra-articular injections are becoming popular because of low cost and minimally non-invasive method has become popular among orthopedics consultants due to its different composition, characteristics, mechanism of action for relieving pain and improving the quality of life. Platelet-rich plasma (PRP) decreases the process of apoptosis in chondrocyte and increases the proteoglycans in hyaline articular cartilage to prevent the progression of OA [6]. PRP is a product, which derived from blood having a natural concentration of many growth factors (GFs) [7]. The autologous GFs participate to reduce inflammation and pain, which ultimately lead to improve joint function [8].

One prospective study evaluated 22 patients who were treated with platelet-rich plasma for early osteoarthritis, in terms of Visual Analogue Scale (VAS) scores, a significant 56.2% reduction in mean VAS pain scores was seen from base line to 6 months from 4.06 ± 1.8 to 1.78 ± 0.94 , $P < 0.001$ (mean decrease 2.28 ± 0.86), indicating less pain, and the pain scores remained reduced by 58.9% at 1 year 1.67 ± 1.33 , $P = 0.001$. They concluded that PRP might have a role in improving pain and function in early knee osteoarthritis [9,10].

The rationale of present study is that population is Geographically and Genotypically different to other population and treatment options of Osteoarthritis, like Knee replacement, is quite high in our country while this novel treatment is being successfully practiced in other part of world is cost effective and promising. This study wants to ascertain the functional outcomes of PRP intra-articular injection in early osteoarthritis of knee in our population where it is quite common.

Extensive literature search has come with no local data is available and previous international studies on efficacy of PRP in osteoarthritis has been on small sample size. If results turn out to be favorable, better practices for early osteoarthritis of knee could be established locally with increasing benefits to patients in term of improved symptoms and functions. The study delineates guidelines for treatment of osteoarthritis as it is cost effective and can be performed on outpatient basis and has less long-term complications as compared to conventional methods.

METHODS

Ninety-three subjects age between 30 – 60 years of either gender those fulfilling the inclusion criteria of early osteoarthritis of knee with pain score 8-10 on Visual analog score (VAS) were included in our study. The study period was from February 15, 2015 to August 15, 2015. Patients taking NSAIDs were advised to stop taking these drugs at-

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least 2 weeks prior to platelet-rich plasma injection. Baseline VAS pain score was recorded. Patients had their affected knee lying supine on table. The area was sterilized with alcohol swab and sterilely dressed. A local anesthetic (1% xylocaine without epinephrine) was used to block the pain receptors of subcutaneous tissue before injecting intra-articular platelet-rich plasma (PRP). The 6 ml of platelet-rich plasma was injected with 18-gauge needle into the synovial space of affected knee joint through classical lateral approach. At the end of procedure, the patients were encouraged for flexion and extension of their knee joints a few times for proper and uniform spread of the platelet rich plasma throughout the joint before becoming gel.

The patients were kept in observation for 30 minutes after injecting intra-articular platelet-rich plasma (PRP). Patients were also instructed to restrict extensive use of their knee for the next 24 hours. Though, they were allowed to perform their daily activities as per routine. For pain assessment, the scale of visual analog score (VAS) was used from base line to at the end of 12 weeks after platelet rich plasma injection. Early OA of knee was defined as symptoms less than 14 weeks and degenerative changes in hyaline articular cartilage along-with new growth of cartilage and bony remodeling on X – ray accompanied with pain in joint. All data was recorded in Performa. Data was analyzed using SPSS version 17.0. Mean and standard deviation were calculated for numerical variables like age, VAS score before and after treatment, duration of osteoarthritis. Frequency and percentage for nominal variables like gender was calculated. Data was stratified for age, gender and duration of osteoarthritis. Post-stratification t-test was applied. P<.05 was taken as

statistical significant. Mean decrease was calculated by subtracting post treatment VAS from pre-treatment VAS.

RESULTS

Total 93 patients with mean age of 49.17 ± 7.993 ranged from 33 to 60 years of age. Study population (n=93) stratified into two groups according to age. 49 patients (52.7%) were below 50 years whereas, 44 patients (47.3%) were either 50 years and above.

8 patients (40.9%) were male while 55 patients (59.1%) were female. Duration of osteoarthritis in 43 patients (46.2%) among sampled population (n=93) was less than one year while it was more than one year in 50 patients (53.8%).

Mean VAS Score pretreatment was 6.5806 ± 1.253 with range of 4 to 6 and Mean VAS score post treatment was 3.2688 ± 1.001 with range of 1 - 6. Mean reduction in VAS Score was 3.31 ± 1.260 ranged from 1 to 6 in sampled population (n=93). (Table I)

When we cross-tabulated reduction in VAS Score with age group p value showed non-significant result on using independent sample test (p= 0.656). Patients below 50 years had mean reduction in VAS Score 3.37 ± 1.167 and patients 50 years and above were with mean reduction in VAS Score 3.25 ± 1.366 . (Table II)

Mean reduction in VAS Score in male patients was 3.50 ± 1.157 and in females it was 3.18 ± 1.321 . (Table III)

Mean reduction in VAS Score for duration of osteoarthritis groups the results was non-significant (p=0.693). Reduction in VAS Score in 43 patients with < 1 years of osteoarthritis had mean VAS scores 3.26 ± 1.329 and with > 1 year with mean VAS Score 3.36 ± 1.208 . (Table IV).

	Age Groups	N	Mean	Std. Deviation
Reduction in VAS Score	Below 50 years	49	3.37	1.167
	50 Years & above	44	3.25	1.366
Using Independent Samples Test, Equal variances assumed, p value = 0.66				

Table II: VAS Score pretreatment, post treatment and Reduction in VAS Score distribution of sampled population

	VAS Score Pretreatment	VAS Score Post treatment	VAS Score Reduction
N	93	93	93
Mean	6.5806	3.2688	3.3118
Std. Deviation	1.25389	1.00152	1.25956
Minimum	4.00	1.00	1.00
Maximum	9.00	6.00	6.00

	Gender	N	Mean	Std. Deviation
Reduction in VAS Score	Male	38	3.50	1.157
	Female	55	3.18	1.321
Using Independent Samples Test, Equal variances assumed, p value = 0.560				

Table IV: Reduction in VAS Score with duration of Osteoarthritis				
	Duration	N	Mean	Std. Deviation
Reduction in VAS Score	Less than 1 years	43	3.26	1.329
	More than one year	50	3.36	1.208
Using Independent Samples Test, Equal variances assumed, p value = 0.693				

DISCUSSION

Osteoarthritis (OA) was considered to be an outcome of aging, and hence referred to as degenerative joint disease. Nonetheless, it is now understood that it stems from a complicated interaction of numerous factors, which include integrity of joints, joint inflammation, role of genes, mechanical forces, and biochemical, cellular & molecular processes [11,12, 13,14,15].

Lately, platelet-rich plasma (PRP) has come up as an innovation and a promising method to initiate repair or substitute cartilage that is damaged, due to the store of growth factors (GFs) in the alpha-granules of platelets, and these are known to regulate articular cartilage [16]. PRP is an easy, straightforward, low on cost and minimally invasive procedure, which allows us to get from the blood, a natural concentrate of autologous GFs [17,18,19,20].

Mean reduction in VAS Score was 3.3 ± 1.2 ranged from 1 to 6 in sampled population. Our results match with those by another prospective study, which evaluated 22 patients. In terms of Visual Analogue Scale (VAS) scores, a notable 56.2% reduction in mean VAS pain scores was observed from the base line to 6 months from 4.06 ± 1.8 to 1.78 ± 0.94 , $P < 0.001$, (mean decrease 2.28 ± 0.86), indicating less pain, and the pain scores remained in same manners of reduction by 58.9% at 1 year 1.67 ± 1.33 , $P = 0.001$. In our study Mean VAS Score pretreatment was 6.5806 ± 1.253 with range of 4 to 6 and Mean VAS score post treatment was 3.2688 ± 1.001 with range of 1 - 6. Mean reduction in VAS Score was 3.31 ± 1.260 . The study concluded that PRP might have a role in improving pain and function in early knee osteoarthritis. In COPCORD study done by Fransen et al showed prevalence of 4.9 % prevalence of osteoarthritis among Pakistani population [11].

Duration of osteoarthritis in 43 patients (46.2%) among our sampled population ($n=93$) was less than one year while it was more than one year in 50 patients (53.8%). It implies the chronicity of the disease. 38 patients (40.9%) were male while 55 patients (59.1%) were female among our sampled population. This gender discrimination may be secondary to either risk factors or health seeking behavior [21,22,23,24]. Mean age of 49.17 ± 7.993 ranged from 33 to 60 years of age implies the burden of disease in younger population. Ergonomics and rehabilitative measures may improve the condition.

Felson 2008 [3] took subjects from Framingham study his results and other corroborative cross-sectional data show that obesity or as yet unknown factors associated with obesity cause knee osteoarthritis after adjustment of age, sex and other risk factors [22]. Our study results of VAS Score reduction was compared in age groups of less than and above 50 years Patients less than 50 years had mean

reduction in VAS Score 3.37 ± 1.167 and patients 50 years and above had mean reduction in VAS Score 3.25 ± 1.366 and was statistically non-significant ($p= 0.656$). Similarly it was noticed that mean reduction of VAS Score in male patients was 3.50 ± 1.157 and in females it was 3.18 ± 1.321 without a significant difference. So we may conclude that gender does not change the effect of intra-articular platelet rich plasma injection in patients with early osteoarthritis of knee.

Though evidence suggests that pathophysiological processes in bone are important determinants of outcome of treatments in osteoarthritis of the knee but factors like low intake and low serum levels of vitamin D may compromise favorable responses of bone to osteoarthritis, altering patients response to different treatment modalities like ultrasound, exercise [25,26]. Intra-articular platelet rich plasma injection in patients with early osteoarthritis of knee is efficacious in improving pain and function in early knee osteoarthritis.

CONCLUSION

Our study concluded that platelet rich plasma injection among patients with early osteoarthritis of knee is efficacious in reducing 50.0% of pain measured of VAS score.

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