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Original article

Intra-articular Platelet Rich Plasma versus Corticosteroid in Treatment of Knee Osteoarthritis Patients

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Abstract

Background: One of the most important treatment modalities for knee osteoarthritis (KOA), which accounts for 23% of all cases of arthritis, is intra-articular injection, which can involve a variety of agents, the most common of which are corticosteroid (CS) and platelet-rich plasma (PRP). Injectable CSs seek to directly alter the inflammatory response on the osteoarthritic surface, while PRP, an autologous blood product, primarily consists of concentrated platelets and growth factors. The study's **purpose** was to evaluate the intra-articular PRP injection impact versus CS in the primary KOA management in to ascertain which intervention is more successful. **Subjects and methods:** this study is a randomized controlled trial and was conducted on 100 patients suffering from KOA diagnosed according to 2016 American College of Rheumatology (ACR) revised criteria. All patients were divided into two equal groups: Group I included 50 patients who were injected intra-articular with two ml of methylprednisolone acetate, and Group II included 50 patients who were injected with five ml of PRP. The knee pain, stiffness, and physical function were assessed through the Western Ontario and McMaster Universities Arthritis Index (WOMAC) at two, six, and 12 weeks. **Results:** Both interventions led to significant improvements in the WOMAC score ($P<0.001$), but the PRP group exhibited lower WOMAC in comparison to the steroid group at all-time points, with statistically significant differences ($P<0.001$ for 2, 6 and 12 weeks). **Conclusions:** PRP is a better long-term method for relieving pain and improving stiffness and physical function in KOA patients.

Keywords: Knee osteoarthritis, Platelet Rich Plasma, PRP, Corticosteroid, WOMAC score.

Introduction:

The knee osteoarthritis (KOA) symptoms comprise pain, loss of function, and harm to the meniscus, cartilage, and bone, among other structures [(1)]. Depending on its cause, KOA is categorized as primary or secondary. Degeneration of articular cartilage without a known cause is the primary KOA. Usually, this is regarded as degeneration brought on by aging and wear and tear. Articular cartilage degeneration for a known cause is secondary KOA [(2)].

Because it inhibits inflammation and lowers prostaglandin synthesis, intra-articular corticosteroids (IACS) are a frequently utilized treatment regimen for alleviating pain in symptomatic KOA. IACS injection should only be used for patients who do not respond to acetaminophen and non-steroidal anti-inflammatory drugs (NSAIDs), according to American College of Rheumatology (ACR) guidelines [(3)]. Patients experiencing acute pain exacerbations, particularly when there is an effusion, are the focus of the European League against Rheumatism's recommendation. The Osteoarthritis Research Society International guidelines conditionally endorse IACS injections as a treatment option for KOA, regardless of whether patients have comorbid conditions [(4)].

Platelet-rich plasma (PRP), an autologous blood derivative, is rich in multiple growth factors comprising platelet-derived growth factor, fibroblast growth factor, epidermal growth factor, vascular endothelial growth factor, and transforming growth factor-β [(5)].

The effect of PRP appears in tissue repair, having anti-inflammatory effect, hemostasis of articular cartilage, healing process, promoting a favorable joint environment and allowing hemostatic balance in degenerative joints, in particular, as a minimally invasive injectable treatment for KOA, PRP is becoming more and more popular in clinical settings [(6)]. PRP is more effective than other injectable options like saline, corticosteroids, and hyaluronic acid, according to multiple randomized controlled trials and meta-analyses that primarily focus on the knee joint [(7)].

This study's objective was comparing the intra-articular injection of PRP impact versus CS in primary KOA treatment to determine which measure is more effective.

Patients and Methods:

This study is a randomized controlled trial. One hundred patients with KOA who were diagnosed using the 2016 ACR revised criteria participated in the study [(8)]. All patients were recruited from Rheumatology, Rehabilitation and Physical medicine department inpatient and outpatient Clinic of Benha University Hospitals from April 2023 to November 2023. According to standing antero-posterior and lateral knee radiographs, those patients, who were between the ages of 40 and 70, had KOA and Kellgren Lawrence grades II or III [(9)]. Patients with coagulopathies, diabetes mellitus, cardiovascular disorders, or those receiving anticoagulant, antiplatelet, or systemic corticosteroid treatment ten days

prior to injection or recent NSAID use were excluded, as were pregnant or nursing women, patients with haemoglobin levels less than ten gm/dl, or patients with platelet counts less than 150,000/ml.

All patients were randomly categorized into two equal groups as follows:

- **Group I:** encompassed 50 participants who were injected intra-articular with two ml of methylprednisolone acetate 40 mg/ml mixed with two ml of lidocaine.
- **Group II:** encompassed 50 participants who were injected intra-articular with five ml PRP prepared in our hospital.

Every patient underwent a comprehensive clinical examination, a complete history taking, and an evaluation of knee pain, stiffness, and physical function using WOMAC scores [(10)].On a scale of zero to four, the test questions are scored as follows: None (0), Mild (1), Moderate (2), Severe (3), and Extreme (4). The scores for each subscale are summed up, with a possible score range of zero-20 for pain, zero-eight for stiffness, and zero-68 for physical function.

The assessment was done before injection, at two, six and twelve weeks after injection for follow-up. Laboratory investigations including complete blood count, erythrocyte sedimentation rate, and C-reactive Protein and radiological investigations; every patient was subjected to standing anteroposterior and lateral knee X-ray for Kellgren and Lawrence grading [(11)]**:** Grade zero (none) indicates that there are no x-ray changes of osteoarthritis; grade one (doubtful) indicates that there is doubtful narrowing of the joint space and possibly osteophytic lipping; grade two (minimal) indicates that there are definite osteophytes and possible narrowing of the joint space; grade three (moderate) indicates that there are moderate multiple osteophytes, definite narrowing of the joint space, some sclerosis, and possible deformity of bone ends; and grade four (severe) involves large osteophytes, marked joint space narrowing, severe sclerosis, and specific bone end deformity.

Ethical consideration: An informed written consent was obtained from all individual participants included in the study prior to the study. The protocol followed the ethical considerations proposed by Benha faculty of medicine ethical committee according to Helsinki declaration with approval number (Ms 54-1-2023).

PRP preparation: Utilizing an 18G needle to prevent platelets from being traumatized, 20 ml of venous blood was extracted from the antecubital vein and placed in a sterile tube with two ml of sodium citrate anticoagulant [(12)]**.** To separate the erythrocytes and concentrate the platelets, the anticoagulant-treated blood was centrifuged for six–ten minutes at 4000 rpm. Four to five milliliters of PRP-containing leukocytes with platelet concentrations three to five times the typical normal value were the end result (**figure 1).**

Statistical analysis

Statistical analysis was executed utilizing IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as mean ± SD for continuous variables and as frequencies

and percentages for categorical variables. The Shapiro-Wilk test was employed to estimate data normality. For comparing the two groups, independent t-tests were used for normally distributed data, whereas Mann-Whitney U tests were applied for non-normally distributed data. Within-group comparisons across different time points for non-parametric variables were undertaken utilizing the Friedman test. Categorical data were analyzed using Chi-Square or Fisher's exact tests as appropriate. Linear regression analysis, adjusted for age and treatment type, was performed to identify predictors of WOMAC score improvement. Statistical significance was defined as $P < .05$ with a 95% confidence interval.

Results:

Eligibility was assessed in a cohort of 100 participants diagnosed with KOA. None were excluded. All 100 participants were then randomized into two groups: Group 1 received steroid injections (n=50) and Group 2 received PRP injections (n=50). All participants were followed up for twelve weeks after the intervention. At each follow-up point (after 2 weeks, 6 weeks, and 12 weeks), both groups were assessed for the intervention's effect. They were age and sex matched. As regard demographic data and disease duration; presented in (**Table 1)**.

The two groups were compared regarding effect on knee tenderness, redness, effusion, limping and deformity **(Table 2).**

Both groups had the same distribution of X-ray grades, with 54%, 52% of participants categorized as grade two and 46%, 48% as grade three in steroids and PRP groups respectively. There was insignificant difference in X-ray grades between the two interventions as P-value = .841.

Both groups were compared regarding WOMAC score and its subscales comprising pain, stiffness and physical functions at two, six and 12 weeks **(Table 3)** and **(figure 2).**

In comparison to the steroid group, the PRP group demonstrated a significantly greater percentage of improvement. The P-value ($P< .001$) suggests that there is a significant difference between the two interventions, suggesting that PRP leads to a greater percentage of improvement in the WOMAC score compared to steroids **(Figure 3).**

A linear regression analysis was conducted for predicting the percent improvement of the WOMAC score based on various factors. In the univariate analysis, only younger age and using PRP showed statistically significant association with better improvement ($P < 0.05$). In the multivariate analysis, after controlling for other factors, younger age, and using PRP remained significant predictors of the percent improvement of the WOMAC score.

Table 1: Comparison between steroid and PRP groups regarding demographic data and duration of osteoarthritis

	Steroid n = 50		PRP n = 50		Test	p
	No.	%	No.	%		
Sex						
Male	14	28.0	13	26.0	χ^2=	0.822
Female	36	72.0	37	74.0	0.051	
Age (years)						
Mean ± SD.	55.70 ± 7.55		55.28 ± 6.69		t=	0.769
Median	55.50		55.0		0.294	
Min. – Max.	41.0 – 70.0		40.0 – 69.0			
BMI (kg/m^2)						
Mean ± SD.	34.30 ± 4.45		32.98 ± 5.21		t=	0.176
Median	35.0		33.0		1.362	
Min. – Max.	24.0 – 44.0		25.0 – 45.0			
Duration (years)						
Mean ± SD.	4.82 ± 3.33		6.10 ± 4.78		U=	0.368
Median	4.0		5.0		1379.5	
Min. – Max.	0.33 – 15.0		1.0 – 20.0			

BMI: body mass index, PRP: platelet rich plasma, SD.: Standard deviation, Min.: Minimum, Max.: Maximum, t: Student t test, χ^2: Chi Square test, U: Mann Whitney test

Table 2: Comparison between steroid and PRP groups regarding effect on knee tenderness, redness, effusion, limping, and deformity

		Before intervention		After intervention		Test	p2
		No.	**%**	**No.**	**%**		
Tenderness	**Steroid n=50**						
	No	0	0.0	25	50.0	MH=	<0.001*
	Mild	13	26.0	19	38.0	64.0*	
	Moderate	19	38.0	6	12.0		
	Severe	18	36.0	0	0.0		
	PRP n=50						
	No	0	0.0	32	64.0	MH=	<0.001*
	Mild	14	28.0	18	36.0	60.0*	
	Moderate	18	36.0	0	0.0		
	Severe	18	36.0	0	0.0		
	Test	χ^2=0.064		χ^2=6.965*			
	p1	0.968		MC 0.030*			
Redness	**Steroid n=50**						
	No	50	100.0	50	100.0		
	Yes	0	0.0	0	0.0		
	PRP n=50						
	No	50	100.0	50	100.0		
	Yes	0	0.0	0	0.0		
Effusion	**Steroid n=50**						
	No	43	86.0	48	96.0	MH=	0.161
	Mild	2	4.0	1	2.0	7.50	
	Moderate	5	10.0	1	2.0		
	PRP n=50						
	No	47	94.0	49	98.0	MH=	0.527
	Mild	2	4.0	0	0.0	3.0	
	Moderate	1	2.0	1	2.0		
	Test	χ^2=2.791		χ^2=1.187			
	p1	MC 0.301		MC 1.000			
Limping	**Steroid n=50**						
	No	18	36.0	35	70.0	McN	<0.001*
	Yes	32	64.0	15	30.0		
	PRP n=50						
	No	20	40.0	38	76.0	McN	<0.001*
	Yes	30	60.0	12	24.0		
	Test	χ^2=0.170		χ^2=0.457			
	p1	0.680		0.499			
Deformity	**Steroid n=50**						
	No	36	72.0	37	74.0	McN	
	Yes	14	28.0	13	26.0	1.000	
	PRP n=50						
	No	38	76.0	38	76.0	McN	
	Yes	12	24.0	12	24.0	1.000	
	Test	χ^2=0.208		χ^2=0.053			
	P1	0.648		0.817			

PRP: platelet rich plasma, χ^2: Chi Square test, MC: Monte Carlo test, MH: Marginal Homogeneity test, McN: McNemar test, p1: Comparing steroid and PRP in each period, p2: Comparing before and after intervention in each group, *: Significant when p value <0.05.

Table 3: Comparison between steroid and PRP groups regarding effect on total pain score, stiffness score, physical function score, and WOMAC score

		Before intervention	After intervention			Test p2	Pairwise comparisons	
			After 2 weeks	**After 6 weeks**	**After 12 weeks**		**p3= before vs.**	
Total pain	**Steroid n=50**							
	mean±SD	7.04±2.86	2.74±1.63	1.62±1.09	3.04±1.23	**Fr=113.1**	2w: p<0.001*	P4<0.001*
	Median (min-max)	7(2-15)	2.5(0-7)	1.5(0-4)	3(1-6)	**P<0.001***	6w:p<0.001* 12w:p<0.001*	P5=0.124 P6<0.001*
	PRP n=50							
	mean±SD	6.08±2.02	2.24±1.15	0.94±1.02	0.52±0.71	Fr=133.9	2w: p<0.001*	P4<0.001*
	Median (min-max)	6(2-14)	2(0-5)	1(0-3)	0(0-2)	P<0.001*	6w:p<0.001* 12w:p<0.001*	P5<0.001* P6=0.001*
	Test (p1)	U=982 P=0.062	U=1047 P=0.150	U=811 P=0.002*	U=48 P<0.001*			
Total stiffness	**Steroid n=50**							
	mean±SD	2.68±1.02	1.48±0.86	1.18±0.69	1.94±0.89	**Fr=69.6**	2w: p<0.001*	P4=0.014*
	Median (min-max)	3(0-5)	1(0-4)	1(0-2)	2(0-4)	**P<0.001***	6w:p<0.001* 12w:p<0.001*	P5=0.003* P6<0.001*
	PRP n=50							
	mean±SD	2.36±1.16	1.12±0.82	0.56±0.61	0.36±0.6	Fr=82.9	2w: p<0.001*	P4<0.001*
	Median (min-max)	3(0-4)	1(0-3)	0.5(0-2)	0(0-2)	P<0.001*	6w:p<0.001* 12w:p<0.001*	P5<0.001* P6=0.085
	Test (p1)	U=1084.5 P=0.233	U=991 P=0.055	U=675 P<0.001*	U=216.5 P<0.001*			
total physical function	**Steroid n=50**							
	mean±SD	21.88±5.42	14.24±4.01	10.98±3.06	10.62±4.03	**Fr=130.2**	2w: p<0.001*	P4<0.001*
	Median (min-max)	20(13-37)	13(9-26)	10(6-20)	10(4-21)	**P<0.001***	6w:p<0.001* 12w:p<0.001*	P5=0.003* P6=0.135
	PRP n=50							
	mean±SD	22.22±5.82	11.08±3.84	7.5±2.92	5.64±2.46	Fr=139.2	2w: p<0.001*	P4<0.001*
	Median (min-max)	21(13-37)	11(4-21)	7(0-14)	5.5(0-11)	P<0.001*	6w:p<0.001* 12w:p<0.001*	P5<0.001* P6=0.085
	Test (p1)	U=1209 P=0.777	U=668.5 P<0.001*	U=515 P<0.001*	U=334.5 P<0.001*			
WOMAC score	**Steroid n=50**							
	Mean ± SD.	31.68 ± 8.07	18.50 ± 5.55	13.80 ± 4.12	15.56 ± 4.97	Fr=133.63 p<0.001*	2w: p<0.001* 6w: p<0.001*	p4<0.001* p5<0.001*
	Median	30.50	17.0	13.0	14.50		12w:	p6=0.004*
	Min. – Max.	20.0 – 55.0	12.0 – 33.0	8.0 – 26.0	8.0 – 30.0		p<0.001*	
	PRP n=50							
	Mean ± SD.	30.62 ± 7.35	14.44 ± 4.87	8.98 ± 3.33	6.50 ± 2.87	Fr=146.51 p<0.001*	2w: p<0.001* 6w: p<0.001*	p4<0.001* p5<0.001*
	Median	29.50	14.0	8.0	6.0		12w:	p6<0.001*
	Min. – Max.	20.0 – 55.0	6.0 – 28.0	1.0 – 16.0	0.0 – 13.0		p<0.001*	
	Test (p1)	U=1163.5 p1=0.550	U=706.5* p1<0.001*	U=435.5* p1<0.001*	U=96.50* p1<0.001*			

PRP: platelet rich plasma, SD.: Standard deviation, Min.: Minimum, Max.: Maximum, U, Mann Whitney test; Fr: Friedman test, p1: Comparing steroid and PRP in each period, p2: Comparing the different periods in each group, p3: Comparing before and each other periods, p4: Comparing after 2w and after 6w, p5: Comparing after 2w and after 12w, p6: Comparing after 6w and after 12w, *: Significant when p value <0.05.

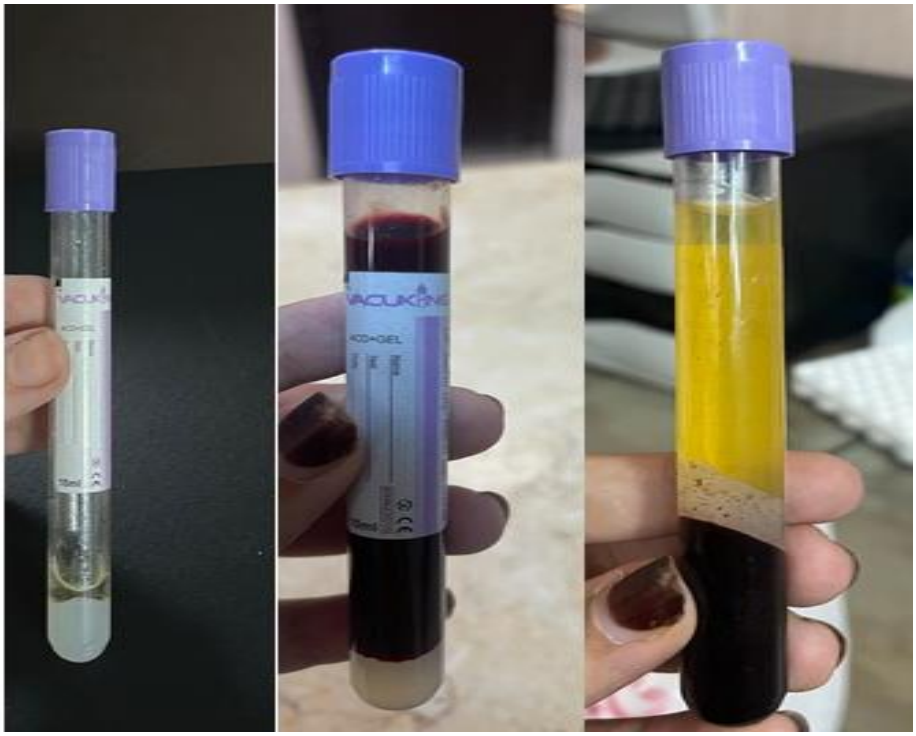

Figure 1: Stepwise platelet-rich plasma preparation

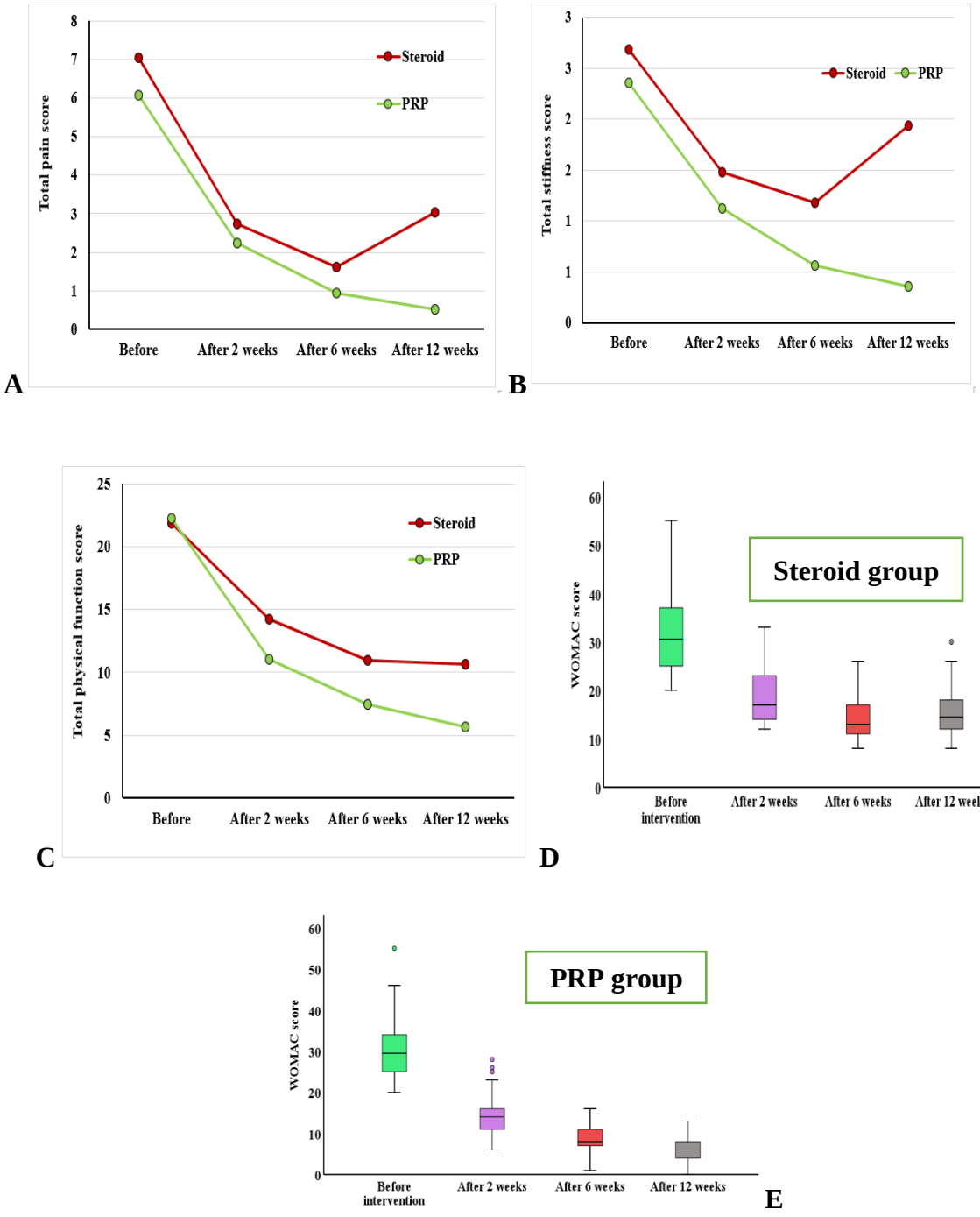

Figure 2: A: Total pain score among steroid and PRP groups. **B**: Total stiffness score among steroid and PRP groups. **C**: Total physical function score among steroid and PRP groups. **D**: Boxplot Chart for comparison the different periods in steroid group regarding WOMAC score. **E**: Boxplot Chart for comparison the different periods in PRP group regarding WOMAC score.

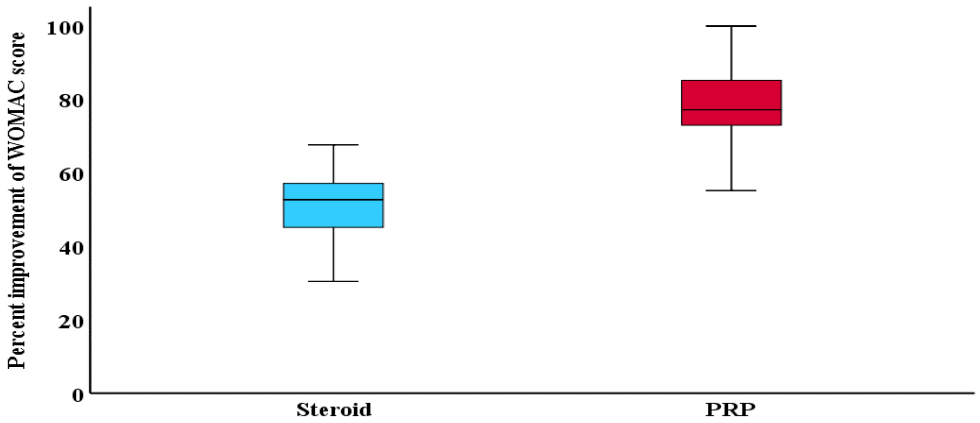

Figure 3: Boxplot Chart for comparison between steroid and PRP regarding percent improvement of WOMAC score after 12 weeks.

Discussion

In the elderly population, KOA stands out as a major contributor to loss of function, debilitating pain, and disability. Even though knee replacements are a good way to treat severe osteoarthritis in the elderly, younger and middle-aged patients with less severe osteoarthritis need to be treated with conservative measures (such as NSAIDs, steroids, and hyaluronic acid (HA) to reduce symptoms and maintain function) due to concerns about implant longevity and revision surgery [(13)].

Our investigation focused on comparing the therapeutic impacts of intra-articular PRP and CS injections for KOA to determine which treatment yields better outcomes.

In the current investigation 100 KOA patients were divided into two ages and sex matched groups, the first group was given intra-articular PRP, and the second group was given intra-articular methylprednisolone acetate. As regard clinical data, we found that PRP and CS intra-articular injection led to significant improvement regarding knee joint line tenderness after 12 weeks follow up. In agreement with our study, another study on the effectiveness of intra-articular PRP in KOA similarly found that there was improvement in knee joint tenderness up to six months after intervention [(14)].

In our results we found that both PRP and IACS injection have no significant effect on knee effusion. Against our results, uncontrolled open-label study with 71 symptomatic KOA individuals reported a significant reduction in knee effusion four weeks following a single intra-articular CS injection [(15)].

Both interventions were associated with significant enhancements in WOMAC scores (P<.001 for each), and baseline comparisons revealed no significant differences among the groups. But, the PRP group exhibited lower WOMAC compared to the steroid group at all-time points (P<.001 for 2,6,12 weeks), suggesting that PRP may be more effective than CSs in reducing pain, stiffness, and

improving physical function based on the WOMAC score.

In consistent with our results, there was a study on 82 OA participants, The WOMAC score, at six, 12, and 24 weeks, revealed that three months post-intervention, both groups experienced reductions in pain, stiffness, and physical function levels and after three months, the PRP group's improvement was more noticeable than the CS group's [16].

Also comparable to our study, in a study comparing the impacts of intra-articular injections of PRP, HA, placebo, and CSs for knee osteoarthritis, the authors discovered that the PRP group performed the best at the three-month mark, followed by the placebo, CSs, and HA groups. The PRP groups had the best results at the 6-month follow-up, followed by HA, CSs, and placebo and the PRP group had the best results at the 12-month follow-up, the placebo, HA, and CS groups [17].

Similar to our results, other authors undertook an analysis on 13 studies for the comparison between CS and PRP. In accordance to the available analysis of WOMAC improvement, there was a statistically significant difference in favor of PRP at short- ($P = .002$), mid- ($P < .001$), and long-term ($P < .001$) follow-ups [18].

In agreement with our study, eight studies on 648 patients demonstrated that IA-PRP injections outperformed CS injections in the treatment of KOA symptoms, such as reduced joint stiffness, better pain management, and increased engagement in sports and exercise at the 12-month mark. Compared to CS injections, PRP proved to be superior in reducing pain and enhancing stiffness, physical function, and activity participation. Also, a systematic review and meta-analysis of eight studies further highlighted that PRP significantly outperformed CS injections in alleviating OA symptoms (pain, stiffness, and functionality) at three, six-, and nine-months following treatment ($P< .01$) [19].

In contrast to our findings, others found that the steroid group outperformed the PRP group in terms of improvement in mean Visual Analogue Scale (VAS) and WOMAC scores at eight weeks follow-up ($P< .05$) and they attributed this to the corticosteroid's quick action [20].

Contrary to our findings, in another study, authors found no evidence of a difference in the total WOMAC score ($P= .84$) between treatment effects (PRP vs. CS) at different times. For up to six months, those with knee osteoarthritis experienced improvements in pain, stiffness, and function with both corticosteroid and PRP interventions; there was statistically insignificant difference between both [21].

Particularly after six and 12 weeks, when the difference was statistically significant, the PRP group's reduction in the overall WOMAC pain score was more noticeable than that of the CS group in the current investigation. In line with our findings, other authors executed a meta-analysis of 42 studies comprising 3696 patients, which revealed that PRP significantly alleviated pain in comparison to HA injections, as indicated by better WOMAC pain and VAS pain scores. Whereas both PRP and CS have anti-inflammatory properties, PRP was more effective than CS in reducing WOMAC pain and VAS, with the greatest improvement observed at

the six-month mark. PRP, however, has a more focused and regulated anti-inflammatory effect. By enhancing angiogenesis and re-epithelialization and regulating the immune response, it lowers inflammation. However, CSs only provide short-term pain relief by generally suppressing the immune system. Furthermore, in conditions affecting the knee joint, like osteoarthritis, PRP may alter the underlying disease process. PRP may slow the disease's progression and stop additional joint damage by encouraging tissue regeneration and repair. Corticosteroids are mainly used to treat symptoms; they do not have the ability to change the course of disease [(22)].

Also comparable to our study, there were twenty-one trials altogether when intra-articular PRP injection was contrasted with intra-articular saline and CS injections, a clinically significant reduction in pain was observed more in PRP group [(23)]

In disagreement with our study, other authors stated that steroids were believed to be the most potent treatment for pain management, whereas multiple PRP and adipose mesenchymal stem cells were thought to be the least effective [(24)]. Also, others examined CS and PRP, and although both groups experienced less pain, there was no discernible difference between them. The greater OA degree in their study (grades 4 and 3) as opposed to the current study (grades 3 and 2) may be the reason for this discrepancy [(25)].

In the current study regarding the decrease in WOMAC score stiffness subscale showed that PRP may be more effective in reducing stiffness over time compared to steroids, especially in the later evaluation periods. Other authors also agreed with our results as their study showed that a significant improvement in the WOMAC Stiffness subscale was observed from baseline to post-treatment for intra-articular PRP, outperforming intra-articular corticosteroid injections [(19)]. Comparable to our study, another study found that there was significant improvement in WOMAC score Stiffness subscale from baseline to after treatment on using intra-articular PRP injection [(26)].

In the present study regarding to decrease in WOMAC score physical function subscale showed that both treatments demonstrated significant improvement, but PRP showed a more pronounced effect in enhancing total physical function over time especially at six and 12 weeks. In agreement with our results, another study comparing the intra-articular PRP, HA and CS using WOMAC score assessment at baseline and six, 12 and 26 weeks after treatment, the physical function subscale of WOMAC score showed that functional improvement was achieved in all groups. At six weeks, the PRP group showed the biggest improvement, followed by the CS group, and then the HA group. At twelve and twenty-six weeks, the PRP group indicated the greatest improvement, followed by the HA group, and the CS group revealed the smallest improvement among the tested methods [(27)] .

Also comparable to our study, other authors demonstrated that following PRP injection, the Tegner score, which measures sport activity, significantly improved from pre-treatment to two months. Following that, values remained stable for up to 24 months of follow-up, after which there was a gradual return to

the pre-treatment level [28]. But against our study, other authors demonstrated that steroids were thought to be the most effective treatment for physical function, while multiple PRP and adipose mesenchymal stem cells were thought to be the least effective [24].

Another study mentioned that in patients aged 40–70 with early or moderate arthrosis (grade 1-3), PRP demonstrated greater efficacy, but its impacts were less pronounced in more advanced stages of the condition [29]. This is consistent with our study, which found that patients aged 40–70 and with knee osteoarthritis stages two and three had better results.

Last but not least, the vast majority of research done on various populations around the world comparing the PRP injection effectiveness versus CS injection for pain relief in KOA has produced encouraging findings in favour of PRP. They all concur that CS injections primarily serve as a damage control tactic rather than addressing the fundamental problems of joint cartilage regeneration and repair. Many of these studies have examined currently available regenerative, minimally invasive therapies, such as PRP. PRP's growth factors promote cartilage regeneration, which lowers pain, enhances joint functionality, and ultimately improves quality of life. Numerous growth factors from enriched platelets, comprising Platelet Derived Growth Factor, which promotes cell proliferation, blood vessel regeneration and repair, and collagen synthesis, are delivered by alpha granules. Changing the Growth Factor Beta promotes angiogenesis and wound healing by increasing cell proliferation and extracellular matrix synthesis. Vascular Endothelial Growth Factor stimulates endothelial cell migration and division. Growth factor for fibroblasts, which promotes proliferation, epidermal growth factor influences angiogenesis, regulates extracellular matrix alterations, and consequently influences fibroblast migration and division. Growth Factor, similar to insulin, promotes cell division, accelerates collagen synthesis, and promotes fibroblast migration [30].

Limitations: Our study lacked the radiological follow up specifically by ultrasound to determine the effect of both interventions on intra-articular structures especially hyaline cartilage regeneration. Also, further follow-up studies over longer duration are needed to determine at which point the patient will lose the effect of injection and return to baseline levels, also larger number of patients at multicenter studies are needed.

Conclusion:

PRP is a more effective long-term approach for alleviating pain and enhancing stiffness and physical function in patients with KOA.

Abbreviations:

ACR: American College of Rheumatology; **CS:** Corticosteroid; **HA:** Hyaluronic Acid; **IACS:** Intra-articular Corticosteroid; **KOA:** Knee osteoarthritis; **NSAIDs:** Non-steroidal anti-inflammatory Drugs; **PRP:** Platelet Rich Plasma; **VAS:** Visual Analogue Scale; **WOMAC:** Western Ontario and McMaster Universities Arthritis Index.

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