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RESEARCH ARTICLE
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ROLE OF AUTOLOGOUS PLATELET RICH PLASMA (PRP) IN MONOCOMPARTMENTAL PRIMARY KNEE OSTEOARTHIRITIS UP TO GRADE-1 AND ITS CLINICAL EVALUATION

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Abstract-
A retrospective, cross-sectional observation study of the outcome of the role of autologous platelet-rich plasma(PRP) in mono-compartmental primary knee osteoarthritis upto grade -1 and its clinical evaluation, in department of orthopedics from January 2021to July 2022(18 months) is presented. There were 60 patients participated in the study. Patients attending the OPD of Orthopedic Department of index medical college with complain of knee pain were screened and those diagnosed as primary knee osteoarthritis were included in the study. Patient classified into grade 0 to 4 on Kellegren Lawrence grading scale were included in study .Patients were followed up for months 6 weeks, 3 months , 6 months and functional outcome of the patients will be checked.
Outcome Analysis: The study group and the control group are advised to follow up at 6 weeks, 3 months and 6 months. Outcome analysis for the efficacy was done for reduction in pain, reduction in stiffness and improvement in physical function using WOMAC scale. The Patients were also assessed for reduction in pain using Visual analog scale both at pre injection and at 6 weeks,3 month and 6 months post injection.
Result: We reported a significant improvement in WOMAC Score at 6 weeks, 3 months and 6 months compared to their pre-injection values, and they showed a tendency of gradual decrease over time post treatment with PRP. In present study it was observed that mean VAS score after treatment (3.05±1.241) with PRP was significantly lower as compared to the preinjection VAS score (7.15±0.988). There was a significant improvement in pain score at 6 weeks, 3 months and 6 months follow up post treatment with PRP.

Keywords: Autologous platelet rich plasma(PRP), Monocompartmental primary knee osteoarthritis, Kellegren Lawrence grading scale, WOMAC scale, visual analogue scale.

INTRODUCTION

Over 20% of those over 45 years old having knee osteoarthritis (OA), which is a chronic, degenerative illness.1 Men are more often affected than women in populations younger than 50 years. Beyond 65 years of age, however, women are affected twice as much as men. 2 After low back pain, OA Knee is only second among the most common reason for decreased work performance.3Osteoarthritis (OA) is a complex degenerative disease affecting all compartments of the joint. Though it is a degenerative

disease, inflammatory mediators definitely have some role rather than a simple wear and tear, which affects cartilage, synovial membrane, ligaments, menisci and subchondral bone.4There are numerous conservative treatments for Knee OA like NSAIDS (Non-steroidal antiinflammatory drugs), opioids which are used to relieve pain but they only give short-term relief. 5These medications have systemic side effects, destroy joint cartilage, and exacerbate osteoarthritis. 6 Other non-operative pain relief techniques, such as intra-articular injections of corticosteroids, ozone, and viscosupplements (Hyaluronic acid), have variable outcomes, are expensive, and require repeated injections.7-9 Additionally, they only have a minor impact on chondrocyte degeneration reduction and regeneration enhancement.10In recent times, tissue healing has been taken into consideration to prevent progression of the disease. New studies have focused on modern therapeutic methods stimulating cartilage healing process and preventing its damage, including application of cytokinase inhibitors, matrix metalloproteinase inhibitors, stem cells, gene therapy and growth factors (GF). 11 Among these, GFs have shown promise in studies conducted in vitro and in vivo to have a healing effect on cartilage. 12–14 The platelet alpha granules contain a sizable amount of GF. 15 As a result, the application of platelet rich plasma has become a viable OA therapeutic option. PRP is an autologous biologic therapy that uses the patient's own plasma and contains endogenous fibrin scaffold and growth factors generated by platelets. 16 PRP contains plasma proteins like fibrin, fibronectin, and vitronectin that function as mesenchymal cell adhesion molecules and arise during the healing process after a trauma in the human body. These proteins also regulate anti-inflammatory signals and balance angiogenesis. 17 According to recent research, PRP injections in OA knee joints show promise for reducing pain, enhancing knee joint RoM, & improving overall quality of life. 18PRP has been demonstrated to be at least as effective as intra-articular hyaluronic acid and steroid injections for the management of symptoms in early OA of the knee. The use of this therapy, could help to promote tissue regeneration. PRP contains alpha granules, which release nearly all of their stored growth factors during the first hour and around 70% of them within first ten minutes. 19PRP injections for knee osteoarthritis are confirmed by current NICE guidelines to pose no significant safety issues, but the evidence for their effectiveness is insufficient and has to be strengthened. 20 The current study's objective is to assess how well PRP works in lowering knee osteoarthritis pain and enhancing physical function & QoL.

MATERIAL& METHODS-

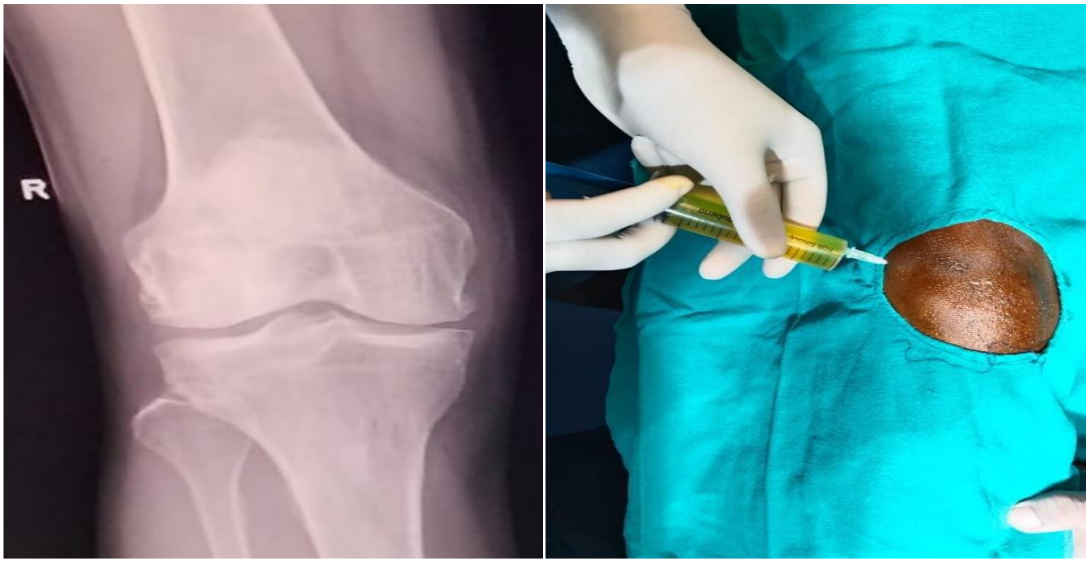
Study type: Cross sectional observations study **Study Centre:** Department of Orthopedics Index Medical College, Hospital & Research Center, Indore **Duration of study:** Jan 2021 to July 2022 (18 months) **Inclusion criteria** All patient of age above 35 years. Diagnosed with mono compartmental primary osteoarthritis of knee by radiograph. Radiologic severity kellgren Lawrence scale less than grade 4 .**Exclusion criteria** Systemic autoimmune rheumatoid disease (connective tissue disease and systemic necrotizing vasculitis) , Uncontrolled diabetes mellitus ,Blood dyscrasias ,Undergoing immunosuppressive therapy ,Patients with impaired cognitive function ,Unwilling to participate ,H/o NSAID use within 5 days prior to blood withdrawal for PRP preparation,Hb <10gm/dl and platelet count <150000/cumm **Sample size:** 60 patients

Methodology –

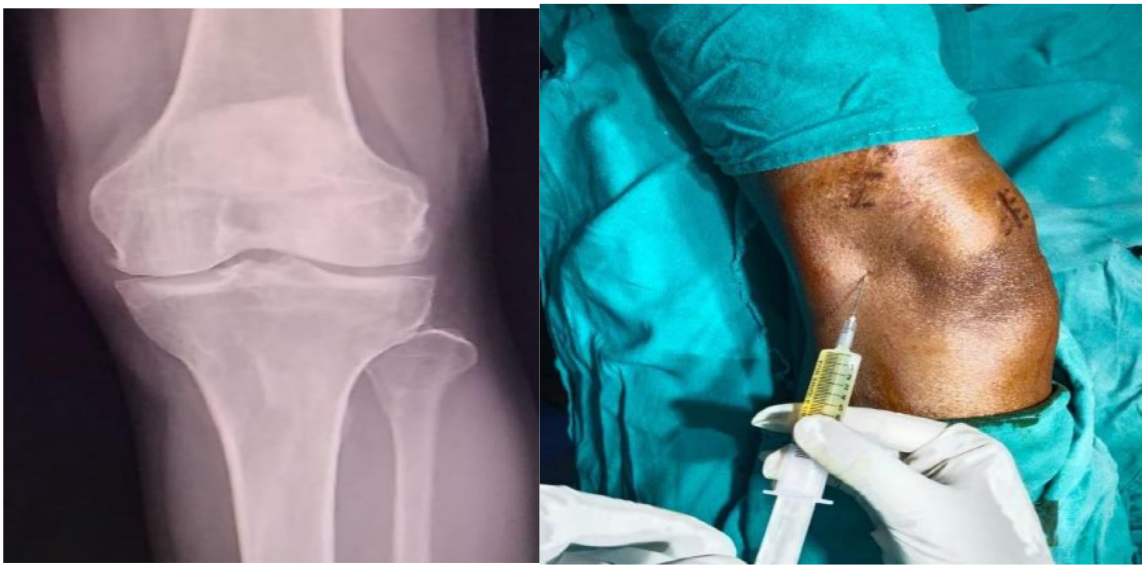
Procedure Written and informed consent was taken from the patient .Patients clinical history and examination finding were recorded prospectively in a case record form .Patients attending the OPD of orthopeadic Department of index medical college with complain of knee pain were screened and those diagnosed as primary knee osteoarthritis were included in the study. Patient classified into grade 0 to 4 on kellegren Lawrence grading scale were included in study .Patient were followed up for months 6 weeks , 3 months , 6 months and functional outcome of the patients will be checked .The orthopeadic Department of index medical college had gracefully consented to prepare and provide Autologous Platelets. The Patient was blinded from knowing the amount of blood collected. The

collected blood was centrifuged in a refrigerated centrifuge and Platelet Rich Plasma was separated after removing red blood cells and buffy coat. The whole process of separating Platelet Rich Plasma was standardized and done under strict aseptic precautions. The Patients baseline platelet count and leucocyte count were determined and Platelet Rich Plasma was quantified as having eight to ten times the baseline valve of platelets. The Concentration of Platelets in final product were corroborated by the Department of Transfusion Medicine on a periodic basis. We in this study did not use leucocyte filter and the final Platelet Rich Plasma contained minute traces of leucocytes .

CASE ILLUSTRATIONS 1



CASE ILLUSTRATIONS 2



OUTCOME ANALYSIS:

The study group and the control group are advised to follow up at 6 weeks, 3 months and 6 months. Outcome analysis for the efficacy was done for reduction in pain, reduction in stiffness and improvement in physical function using WOMAC scale. The Patients were also assessed for reduction in pain using Visual analog scale both at pre injection and at 6 weeks,3 month and 6 months post injection.

STATISTICAL ANALYSIS

All the data analysis was performed using IBM SPSS ver. 20 software. Frequency distribution and cross tabulation was performed to prepare the tables. Categorical data is expressed as number and

percentages. Quantitative variables were expressed as mean and standard deviations. Chi Square test was performed to compare the variables. One-Sample Statistics were performed to compare the WOMAC scale score. Paired Samples Statistics was performed to compare the VAS between pre and post treatment. P value of <0.05 was considered as significant.

Observation & results

Table 1: Age wise distribution of patients with Knee Osteoarthritis

Age group (years)	Frequency	Percent
≤40	7	11.7
41-50	23	38.3
51-60	23	38.3
>60	7	11.7
Total	60	100.0
Mean age	50.60±7.58	

Majority of the patients with knee osteoarthritis had age between 41-60years (76.6%). Mean age of study population was 50.60±7.58 years.There were 7 patients (11.7%) each who were older than 60 years andthose having age less than 40 years.

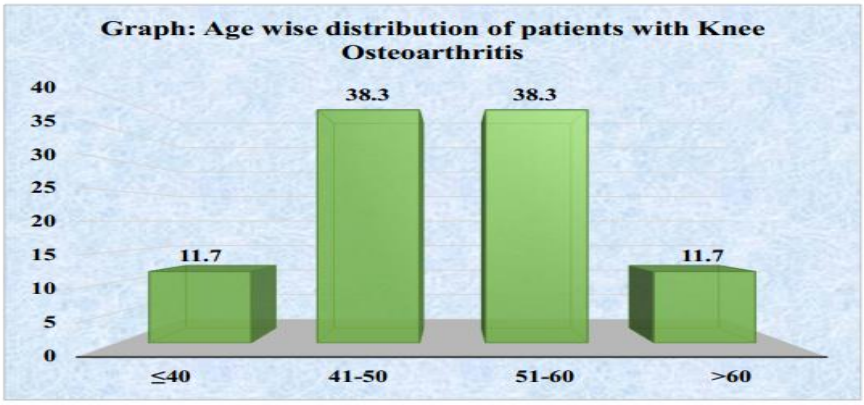


Table 2: Sex wise distribution of patients with Knee Osteoarthritis

Sex	Frequency	Percent
Female	12	20.0
Male	48	80.0
Total	**60**	**100.0**

Majority of the patients with knee osteoarthritis were males (80%)compared to 20% females.

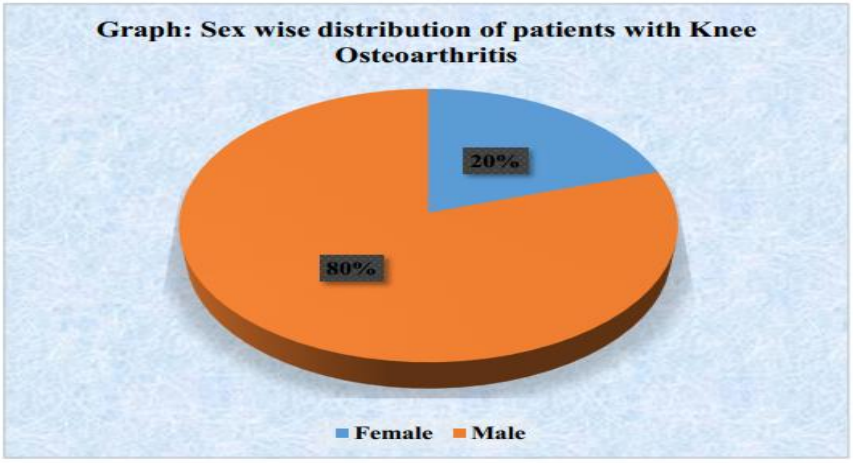


Table 6: Comparing WOMAC Score

One-Sample Statistics					95% CI		P value
	N	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	
Pre-injection	60	74.40	4.951	.639	73.12	75.68	
6 weeks	60	62.82	6.856	.885	61.05	64.59	<0.001
3 months	60	47.83	9.213	1.189	45.45	50.21	<0.001
6 months	60	34.10	8.925	1.152	31.79	36.41	<0.001

P value is compared to previous time point.

On comparing the WOMAC Score among the patients receiving PRP itwas revealed that there was a significant improvement in WOMACScore at 6 weeks, 3 months and 6 months follow up post treatmentwith PRP. Mean WOMAC Score at 6 weeks improved to 62.82±6.856from 74.40±4.951 at Pre-injection ($p<0.001$), similar trend wasobserved at 3 months where mean WOMAC Score improved to47.83±1.189 from 6 weeks score ($p<0.001$). Similarly at 6 monthsfollow-up WOMAC Score improved to 34.10±8.925 from 3 monthsscore ($p<0.001$). This showed that treatment with PRP improve the

WOMAC Score in patients with mono-compartmental primary kneeosteoarthritis.

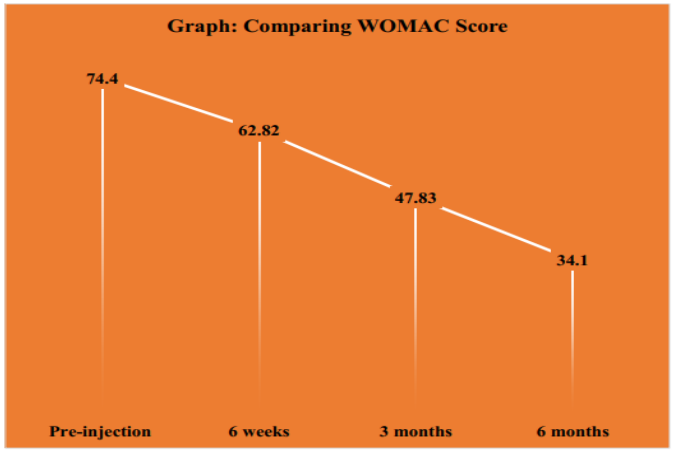


Table 8: Comparing pain score

One-Sample Statistics					95% CI		P value
Pain score	N	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	
Pre-injection	60	16.68	2.902	.375	15.93	17.43	
6 weeks	60	11.48	2.771	.358	10.77	12.20	<0.001
3 months	60	7.57	2.174	.281	7.01	8.13	<0.001
6 months	60	5.48	1.631	.211	5.06	5.90	<0.001

P value is compared to previous time point.

On comparing the pain score among the patientsreceiving PRP it wasrevealed that there was a significant improvement in pain score at 6weeks, 3 months and 6 months follow up post treatment with PRP.Mean pain score at 6 weeks improved to 11.48±2.771 from16.68±2.902 at Pre-injection ($p<0.001$), similar trend was observed at 3months where mean pain score improved to 7.57±2.174 from 6 weeksscore ($p<0.001$). Similarly at 6 months follow-up pain score improvedto 5.48±1.631 from 3 months score ($p<0.001$). This showed thattreatment with PRP improve the pain score in patients with mono-compartmental primary knee osteoarthritis.

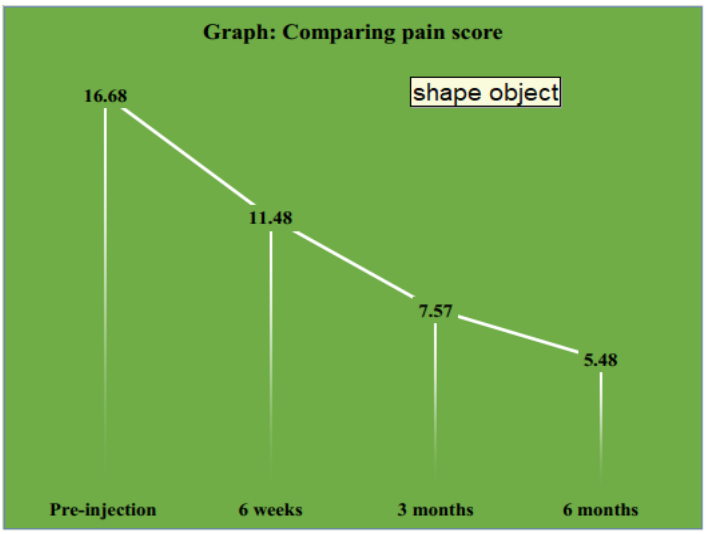


Table 9: Comparing Stiffness Score

One-Sample Statistics					95% CI		P value
Stiffness score	N	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	
Pre-injection	60	5.68	1.295	.167	5.35	6.02	
6 weeks	60	4.73	1.247	.161	4.41	5.06	<0.001
3 months	60	3.83	1.196	.154	3.52	4.14	<0.001
6 months	60	3.50	1.242	.160	3.18	3.82	<0.001

On comparing the stiffness score among the patients receiving PRP itwas revealed that there was a significant improvement in stiffnessscore at 6 weeks, 3 months and 6 months follow up post treatment withPRP. Mean stiffness score at 6 weeks improved to 4.73±1.247 from5.68±1.295 at Pre-injection ($p<0.001$), similar trend was observed at 3months where mean pain score improved to 3.83±1.196 from 6 weeksscore ($p<0.001$). Similarly at 6 months follow-up pain score improvedto 3.50±1.242 from 3 months score ($p<0.001$). This showed that treatment with PRP improve the stiffness score in patients with mono-compartmental primary knee osteoarthritis.

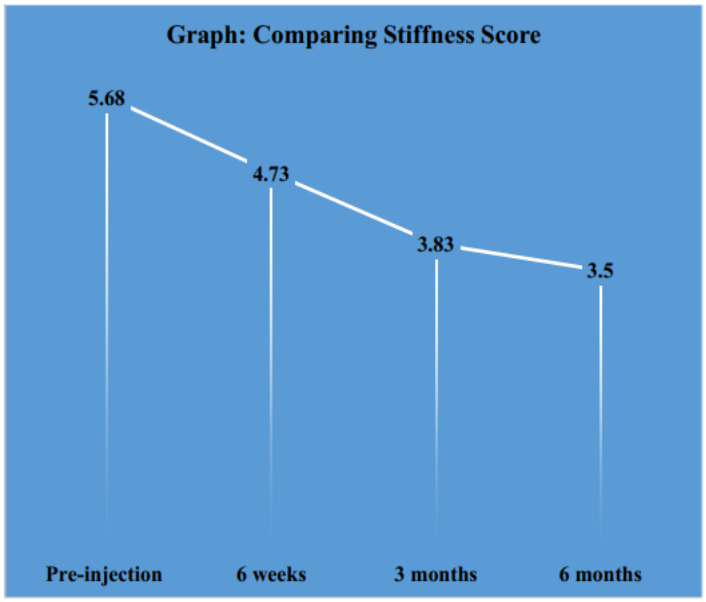
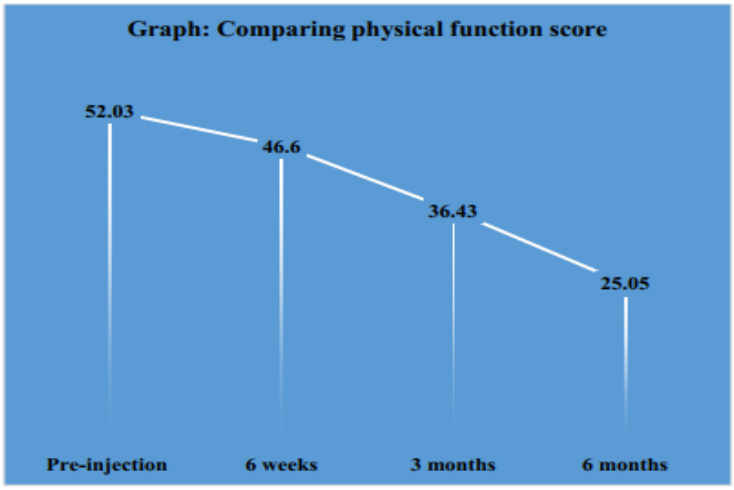


Table 10: Comparing physical function score

One-Sample Statistics					95% CI		P value
Physical function	N	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	
Pre-injection	60	52.03	3.940	.509	51.02	53.05	
6 weeks	60	46.60	4.655	.601	45.40	47.80	<0.001
3 months	60	36.43	7.226	.933	34.57	38.30	<0.001
6 months	60	25.05	7.296	.942	23.17	26.93	<0.001

On comparing thephysical function score among the patients receivingPRP it was revealed that there was a significant improvement inphysical function score at 6 weeks, 3 months and 6 months follow uppost treatment with PRP. Mean physical function score at 6 weeksimproved to 46.60±4.655 from 52.03±3.940 at Pre-injection ($p<0.001$),similar trend was observed at 3 months where mean pain scoreimproved to 36.43±7.226 from 6 weeks score ($p<0.001$). Similarly at 6months follow-up pain score improved to 25.05±7.296 from 3 monthsscore ($p<0.001$). This showed that treatment with PRP improve thephysical function score in patients with mono-compartmental primaryknee osteoarthritis.



Details of the patients and follow-up are illustrated in the table.

S. No	Age	Sex	Height	Weight	BMI	PREINJECTION SCORE	WOMAC SCORE			VAS		Preinjection score			6 weeks			3 months			6 months		
							6 weeks	3 months	6 months	Pre	Post	Pain	stiffness	Physical function	Pain	stiffness	Physical function	Pain	stiffness	Physical function	Pain	stiffness	Physical function
1	52	M	160	65	25.4	82	72	66	52	8	4	18	8	56	14	6	52	12	4	50	8	4	40
2	56	F	152	69	29.9	86	80	72	66	8	5	18	8	60	15	8	57	15	6	51	12	6	48
3	58	M	156	70	28.8	78	70	62	50	6	2	15	6	57	11	6	53	7	6	49	6	6	38
4	40	M	164	65	24.2	74	66	48	30	6	2	20	6	48	16	4	46	10	2	36	6	2	22
5	38	M	160	64	25	72	60	30	24	6	2	18	4	50	12	4	44	5	2	23	4	2	18
6	56	M	148	62	28.3	70	60	44	30	6	2	18	6	46	13	6	41	8	5	31	6	4	20
7	52	M	156	64	26.3	78	64	42	32	8	4	16	8	54	10	6	48	6	6	30	4	6	22
8	46	M	152	63	27.3	74	52	32	26	6	2	17	6	51	7	4	41	6	4	22	4	4	16
9	45	F	150	58	25.8	72	66	46	28	8	2	18	8	46	15	6	45	7	4	35	6	4	18
10	48	M	160	78	30.5	68	56	44	38	6	5	14	6	48	10	4	42	6	2	36	6	2	30
11	48	M	175	76	24.8	66	52	46	28	6	2	12	4	50	8	4	40	8	4	34	4	4	20
12	45	M	168	64	22.7	66	52	44	32	6	4	12	4	50	8	4	40	6	4	34	4	4	24
13	60	M	162	70	26.7	74	52	40	36	6	2	15	4	55	8	4	40	7	3	30	4	3	29
14	58	M	152	63	27.3	68	56	42	32	6	2	13	3	52	9	3	44	5	2	35	5	2	25
15	42	M	160	68	26.6	68	52	38	28	6	2	13	3	52	8	2	42	7	2	29	6	2	20
16	38	F	145	62	29.5	68	56	40	36	6	2	10	4	54	7	3	46	5	2	33	5	2	29
17	48	F	142	66	32.7	66	46	40	32	6	3	8	4	54	4	2	40	4	2	34	4	2	26
18	62	M	160	78	30.5	78	66	52	40	6	2	17	5	56	12	3	51	7	3	42	5	3	32
19	56	F	156	56	23	78	66	54	30	8	2	22	6	50	12	6	48	8	5	41	6	3	21
20	56	M	164	66	24.5	72	66	52	40	6	4	16	5	51	12	4	50	8	4	40	6	2	32
21	48	M	160	68	26.6	70	66	52	32	8	2	12	4	54	9	3	54	5	3	44	4	2	26
22	45	M	158	68	27.2	72	62	54	38	6	2	14	6	52	9	6	47	8	6	40	6	6	26
23	48	M	162	72	27.4	74	58	40	26	8	2	15	5	54	10	4	44	6	4	30	5	3	18
24	56	M	170	75	26	68	56	38	24	8	3	17	6	45	12	5	39	7	4	27	5	2	17
25	48	F	156	66	27.1	78	62	42	30	8	5	20	6	52	12	4	46	7	4	31	5	4	21
26	44	M	160	68	26.6	76	66	52	30	6	3	19	6	51	14	6	46	10	4	38	6	4	20
27	52	M	170	74	25.6	74	66	54	40	8	6	15	7	52	11	6	49	8	5	41	6	3	31
28	62	M	163	58	21.8	68	54	40	30	6	2	16	5	47	10	4	40	8	4	28	6	3	21
29	48	M	160	69	27	72	66	44	32	8	5	22	5	45	18	4	44	9	3	32	6	3	23
30	56	M	162	78	29.7	70	62	50	40	8	5	20	6	44	14	6	42	7	5	38	5	5	30
31	52	F	156	70	28.8	72	62	46	28	8	4	19	7	46	14	6	42	8	4	34	6	4	18
32	48	F	160	68	26.6	76	64	38	26	8	1	17	6	53	12	4	48	6	4	28	4	2	20
33	56	M	158	68	27.2	70	66	52	38	8	4	16	6	48	12	6	48	8	4	40	7	4	27
34	63	M	163	61	23	72	66	54	36	8	3	17	5	50	14	4	48	10	4	40	8	4	24
35	55	M	162	71	27.1	78	66	45	32	8	2	18	6	54	12	5	49	7	3	35	5	3	24
36	53	M	167	82	29.4	78	68	52	32	6	3	15	5	58	10	5	53	7	3	42	5	3	24
37	46	M	153	72	30.8	72	68	58	30	8	3	14	6	52	12	5	51	8	4	46	4	3	23
38	45	F	158	60	24	78	62	42	28	8	3	18	6	54	10	5	47	6	3	33	4	3	21
39	42	M	165	72	26.4	76	60	44	30	8	3	20	5	51	12	4	44	7	4	33	6	4	20

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							6 weeks	3 months	6 months	Pre	Post	Pain	stiffness	Physical function	Pain	stiffness	Physical function	Pain	stiffness	Physical function	Pain	stiffness	Physical function
40	38	F	160	58	22.7	74	58	44	28	7	3	19	5	50	13	4	41	8	3	33	6	3	19
41	53	M	157	81	32.9	78	66	52	40	8	5	16	6	56	10	5	51	6	5	41	4	5	31
42	35	M	163	71	26.7	74	66	48	32	8	4	13	5	56	9	5	52	6	3	39	4	2	26
43	41	M	156	67	27.5	82	68	56	40	8	6	21	6	55	12	5	51	9	4	43	6	4	30
44	38	M	169	73	25.6	76	66	48	26	8	2	17	4	55	10	4	52	8	4	36	4	4	18
45	42	M	173	82	27.4	84	70	58	32	8	3	22	6	56	15	5	50	9	4	45	4	3	25
46	38	M	168	69	24.4	74	52	40	26	8	2	14	5	55	7	3	42	5	3	32	4	3	19
47	58	M	157	86	34.9	78	65	49	28	8	3	18	7	53	13	5	47	7	5	37	5	4	19
48	61	M	163	73	27.5	82	66	52	38	8	4	19	5	58	13	4	49	9	4	39	5	4	29
49	59	M	154	59	24.9	80	72	58	36	8	3	20	6	54	16	5	51	10	3	45	6	3	27
50	62	M	158	65	26	76	64	48	32	8	2	16	4	56	10	4	50	6	4	38	5	3	24
51	48	M	160	65	25.4	82	72	66	52	8	4	18	8	56	14	6	52	12	4	50	8	4	40
52	55	F	152	69	29.9	86	80	72	66	8	5	18	8	60	15	8	57	15	6	51	12	6	48
53	61	F	156	70	28.8	78	70	62	50	6	2	15	6	57	11	6	53	7	6	49	6	6	38
54	62	M	164	65	24.2	74	66	48	30	6	2	20	6	48	16	4	46	10	2	36	6	2	22
55	48	M	160	64	25	72	60	30	24	6	2	18	4	50	12	4	44	5	2	23	4	2	18
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58	58	M	152	63	27.3	74	52	32	26	6	2	17	6	51	7	4	41	6	4	22	4	4	16
59	49	M	150	58	25.8	72	66	46	28	8	2	18	8	46	15	6	45	7	4	35	6	4	18
60	53	M	160	78	30.5	68	56	44	38	6	5	14	6	48	10	4	42	6	2	36	6	2	30

DISCUSSION

Osteoarthritis, the most common form of joint disease, is directly tied to ageing and affects over 80 percent of persons who are 55 years of age or older. 127 It is significantly more prevalent in females,particularly after menopause. Knee osteoarthritis is very frequent, and the chance of developing the condition is highly correlated with a person's body mass index. 128 Symptoms include pain when walking, standing up from a chair, ascending or descending stairs, and stiffness after periods of rest. Other symptoms include a decreased range of motion in the affected joint. Patients will often describe their pain as being worse when they are active and better while they are resting;however, patients with severe disease may have discomfort even when they are at rest. A further common symptom is "gelling," which refers to the sensation of stiffness that follows any period of rest. When experienced, morning stiffness often does not endure for longer than half an hour. Because there are so many causes that can cause cartilage degeneration, osteoarthritis (OA) can present itself in a wide variety of forms.Those who are afflicted with the disease and their families, who are forced to make adjustments to their way of life and living arrangements, are subjected to significant financial burdens as a result of osteoarthritis (OA), including the costs associated with treatment. These costs are in addition to the losses in productivity at work. On a physical as well as a psychological level, the presence of pain and other OA symptoms can have a significant negative impact on a person's quality of life. This excruciating and debilitating disease affects millions of people and leaves them unable to function normally.The incidence of diagnosed symptomatic knee OA ranged from 0.37% per year for nonobese males to 1.02% per year for obese women, according to Losina et al. The age group from 55 to 64 years old had the highest incidence of identified symptomatic knee OA.129 The anticipated median age at knee OA diagnosis was 55. In a 2018 study, AlKuwaity et al. found that knee osteoarthritis affected 24.5% of the older population they studied. It was found in 26.8% of females and 26.1% of males. 130 According to a study by Palo et al. (2015), there was a wide age range in India, with participants' ages ranging from 55 to 92, with a mean age of 63.131 According to Al-Modeer et al., prevalence was 29.5%, which is lower than our finding. 132 .In our study 80% of the patients with knee osteoarthritis were males compared to females (20%). Our findings are in contrast to a research done in Bhubaneswar that discovered 66% of patients were female and 44% were male, with a female to male ratio of 1.9:1. 2015's Palo et al. In a research by AlKuwaity et al., osteoarthritis was virtually equally prevalent in males and females (26.8% and 26.1%, respectively);130 however, Cui et al. found that women are 1.69 and 1.39 times more likely than men to develop knee OA globally. 133Another study conducted in India 134 indicated that women were more likely to have OA knees than men, which is consistent with other earlier studies. 135In our study mean weight of study population was 68.15±6.67 Kgs while majority of the patients with knee osteoarthritis had height with mean height of 159.02±6.54 cm. Sharma et al.134 reported the primary OA knee with mean weight 63.7±10.1 kg and mean height 153.9±7.2 cm in their study.The risk of developing osteoarthritis with an increase in BMI was identified in the current investigation, while Shanghi et al. showed a clear relationship between obesity and knee osteoarthritis in India. 136Al-Arfaj et al. discovered a negligible correlation between increasing BMI and osteoarthritis of the knee. Only after theBMI was divided into quintiles did the correlation between clinical OA and weight and BMI become clear.137An important modifiable cause of knee OA is known to be obesity. The knee's increased axial loading from a high BMI causes mechanical wear on the cartilage. The metabolic overproduction of fat also contributes to knee joint inflammation and the release of cartilagedegrading enzymes. In their investigation into the COMP levels in KOA, Verma and Dalal discovered a link between KOA and high BMI. 138 Given the high prevalence of obesity (63.3%) in the population under study, osteoarthritis may have a strong connection to obesity.We reported a significant improvement in WOMAC Score at 6 weeks, 3 months and 6 months compared to their pre-injection values, and they showed a tendency of gradual decrease over time post treatment with PRP. Similar outcomes were attained by Louis et al. 139, who found that the mean change in WOMAC total score from baseline to three months was -10.1 (-17.0 to -3.3; -27.7%) following PRP injection. Both of the therapies used in this study—PRP and HA—were successful in enhancing knee functional status and reducing symptoms, with a significant drop in all scores seen after one

month.139 Kavadar et al.'s findings, which showed statistically significant improvements in all of the evaluated measures' mean WOMAC total, WOMAC pain, WOMAC stiffness, and WOMAC function scores across all groups, also lend support to our findings.140 According to a systemic study by Kanchanatawan et al., PRP injections resulted in lower mean WOMAC total scores of 15.4 (95% CI: 28.6, 2.3, p = 0.021). However, there were no appreciable variations in the WOMAC pain, stiffness, and function scores after PRP injections. 141According to this study, PRP injection improved functional results (WOMAC total scores) over the short term (1 year), however there was no statistically significant difference in adverse events. 141 Similar findings with a significant decline in the WOMAC pain levels during the 6- to 7-week and 6-month periods were obtained in a research by Sánchez et al.142 Our study showed that treatment with PRP improves the WOMAC Score in patients with mono-compartmental primary knee osteoarthritis.After treatment with two injections of WBC-filtered PRP with an average absolute count of 23.85 billion platelets injected per knee, Bansal et al. 143 observed a significant improvement in WOMAC scores within 2-3 weeks with worsening at 6-months. (2013) Halpern et al. This study demonstrates continued efficacy a year after a single injection. In four randomised controlled trials, it was found that PRP was considerably superior to HA injections in terms of WOMAC and IKDC scores (P< 0.001). 140

In present study it was observed that mean VAS score after treatment (3.05±1.241) with PRP was significantly lower as compared to preinjection VAS score (7.15±0.988). There was a significant improvement in pain score at 6 weeks, 3 months and 6 months follow up post treatment with PRP. Sánchez et al finding .'s study's that the mean VAS scale decreased at 6-7 weeks and 6 months corroborated these findings. (2012) Sanchez et al. The study found a strong connection (r = 0.7304, P = 0.0000) between the WOMAC and VAS scores. 56 This demonstrates how PRP therapy helps patients with mono-compartmental primary knee osteoarthritis achieve a lower VAS Score.In a research by Wu et al., the pain and total scores on the Western Ontario and McMaster Universities Osteoarthritis Index were considerably lower in the PRP group than in the normal saline group (Wu et al., 2018). There were no discernible variations in muscle strength between the PRP group and normal saline, despite the PRP group having a significantly larger proportion of knee strength (extensor > flexor) over a longer follow-up period.144 In our study there was a significant improvement in physical function score at 6 weeks, 3 months and 6 months follow up post treatment with PRP. Mean physical function score at 6 weeks improved to 46.60±4.655from 52.03±3.940 before injection (p<0.001) and mean stiffness score at 6 weeks was improved to 4.73±1.247from 5.68±1.295 at pre-injection (p<0.001). The similar trend for physical function and stiffness score were observed on follow up. Research 113 by Patel et al. also found that only a modest deterioration occurred at the 6-month follow-up, with all WOMAC measures showing a statistically significant improvement within 2 to 3 weeks and persisting until the last follow-up at 6 months. Three different groups getting various doses all demonstrated this improvement. The mean WOMAC scores (pain, stiffness, physical function, and total score) changed significantly after a single PRP injection, going from 10.18, 3.12, 36.56, and 49.86 at baseline to 5.00, 2.10, 20.08, and 27.18 at the end of the study.113PRP intra-articular injections have been shown to be effective in treating OA with promising clinical results, according to growing body of research. Three intra-articular injections spaced by 15 days were used in a double-blind, randomised controlled trial by MontaezHeredia et al. to compare the effectiveness of PRP and HA in treating knee OA. The Knee and Osteoarthritis Outcome System scale, the European Quality of Life scale, and the visual analogue scale were used to assess pain and functional gains before and after therapy (3-and 6-mo follow-up). The authors came to the conclusion that PRP treatment effectively reduced pain in patients with early OA grades at 3 months after injection when compared to HA. 145 According to a recent study, in individuals with knee OA, intraarticular PRP dramatically reduced symptoms compared to HA or a placebo. 146 However, a recent study including 192 patients found that PRP's effectiveness was on par with that of HA therapy. 120 It was asserted that the study design could have a significant impact on outcome measurements, with a poor design potentially leading to incorrect interpretation of the findings.PRP has been demonstrated to have stimulatory effects on mesenchymal stem cells and fibroblasts as well

as anti-inflammatory effects via growth factors including transforming growth factor- and insulin-like growth factor 1. According to numerous research, PRP ismore effective than hyaluronic acid and corticosteroids at enhancing patient-reported pain and functionality scores. 147There are several restrictions on this study. First, the study population was fairly modest in size. To clarify the effects of PRP on isokinetic muscular strength, additional trials with a bigger sample size, more meticulous design, and longer follow-up duration are needed. Second, we could not measure PRP composition, including the amounts of platelets, white blood cells, and growth factors since we used just one injection of PRP rather than numerous injections due to cost and ethical concerns. One PRP injection was employed in the majority of earlier research' study designs. Furthermore, Patel et al. demonstrated that in cases of early knee OA, a single dosage of PRP is just as efficacious as a double dose. This result demonstrates the validity of our study design, which was to conduct a placebo-controlled study as opposed to one that was dose- or concentration-dependent. 116 Future research that incorporates these design components may be required.

CONCLUSION

In conclusion, this prospective, single arm study revealed that intraarticular PRP injected into a patient with bilateral knee OA could improve long-term pain, physical functional activity and knee strength. Furthermore, PRP treatment significantly improves pain, stiffness, and disability in patients with knee OA.

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