

**EFFECTIVENESS OF PLATELET RICH PLASMA (PRP) IN PAIN MANAGEMENT OF  
OSTEOARTHRITIS (OA) KNEE****Dr. Asiful Haque<sup>\*1</sup>, Dr. Md. Amanath Ullah<sup>2</sup>, Dr. Fatama Sharmin<sup>3</sup>, Dr. Ziaur Rahman Chowdhury<sup>4</sup>, Dr. S. M. Mazharul Islam<sup>5</sup>, Dr. H. N. Masuk Rahman<sup>6</sup>**

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**ABSTRACT**

**Introduction:** Osteoarthritis (OA) is an ongoing joint illness that typically happens in more established individuals and prompts torment and incapacities. OA treatment goes from drug treatment to medical procedure. Medication and restoration treatment are liked over a medical procedure, and, particularly, there is an inclination toward intensifies causing regenerative changes in the knee joint. In the current investigation, the impacts of platelet-rich plasma (PRP) infusion and prolotherapy (PRL) were inspected fair and square of torment and capacity of the knee joint in patients with OA. **Methods:** After satisfying the incorporation rules and marking the educated assent structure, 84 patients with knee OA were booked for intra-articular infusion in the present randomized, twofold visually impaired, clinical preliminary. Following admission to the working torment room, the state of the patient's knee was assessed first through the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and, then, at that point, ultrasound-directed knee infusion was finished. Appropriately, patients in the PRP treatment bunch got 7 mL PRP arrangement and those in the PRL bunch got 7 mL 25% dextrose. Utilizing the WOMAC, levels of agony and knee work were assessed and recorded for every persistent promptly before the primary infusion just as at multi month (quickly preceding the subsequent infusion), 2 months (a month after the subsequent infusion), and a half year after the fact. Information gathered were investigated utilizing the SPSS v.20. **Results:** During the first and second months, a quick reduction in the in general WOMAC score was seen in the two gatherings. The generally speaking WOMAC score expanded at the 6th month, however was lower than the by and large WOMAC score in the main month. Measurable investigation demonstrated that the by and large WOMAC score fundamentally diminished in the two gatherings of patients more than a half year. **Conclusion:** Results of the current examination recommended a critical reduction in the by and large WOMAC score of patients who go through either PRP treatment or PRL. This positive change in the generally speaking WOMAC score prompted an improvement in the personal satisfaction of patients with knee OA soon after the principal infusion. PRP infusion is more successful than PRL in the treatment of knee OA.

**KEYWORD:** knee osteoarthritis, platelet-rich plasma, prolotherapy, ultrasound.

**INTRODUCTION**

Maturing influences practically all physiological cycles and causes changes in body organization. As of late, a ternion incorporating synchronous obliteration of bone, muscle, and fat tissues has been distinguished and named the osteosarcopenic stoutness syndrome.<sup>[1,3]</sup> Osteopenia

is the other issue that influences elderly folks individuals, particularly in the neck of the femur or lumbar spine. Practically 80% of the American populace over age 65 experiences osteoarthritis (OA). OA is a constant age-related joint illness that generally happens in more seasoned individuals and harms articular ligament and

synovial joints. OA causes huge disabilities and useful limits in day by day exercises of influenced patients. The main side effects incorporate joint torment, solidness, expanding, and diminished scope of motion.<sup>[1,4]</sup> Given the high frequency of this illness and expenses of clinical medicines, OA can be viewed as a monetary weight on society. Accessible medicines for OA can be characterized into three gatherings: drug, nondrug/nonsurgical (eg, physical and restoration treatment, word related treatment, rub, work out) – which are the essential line of treatment – and careful treatments. The succession of treatment application starts with drug treatments and closures with careful therapies.<sup>[5,6]</sup> Injectable meds that can cause regenerative changes in tissue structure, oversee and lighten OA side effects, and help adapt to the basic tissue pathology are vital. This significance is because of the way that these prescriptions are palliative as well as reconstructive and preventive against substitution medical procedures. Platelet-rich plasma (PRP) exists in this class. Platelets – other than adding to the interaction of hemostasis – assume distinctive basic parts in the body. For instance, following a tissue injury, platelets draw in white platelets to the site of injury and keep harmed cells from being contaminated. Additionally, platelets contain a development factor (ie, platelet-determined development factor [PDGF]) that expands the creation of undifferentiated cells. This trademark has made platelets alluring in OA treatment. Prolotherapy (PRL) is suggested for ongoing musculoskeletal and agonizing joint conditions, for example, knee OA.<sup>[7,9]</sup> PRL includes the infusion of an aggravation arrangement into a harmed zone to support cell multiplication. In this way, modest quantities of an aggravation arrangement (hypertonic dextrose infusion) are infused sometimes into a harmed joint space. The specific system of PRL activity isn't surely known at this point; in any case, it is presumably intervened by incitement of nearby recuperating cells through aggravation enlistment. The adequacy of PRL and other aggravation factors for the therapy of knee OA has been accounted for in different studies.<sup>[10,17]</sup> In the current examination, the viability of PRP treatment and PRL are looked at in lessening torment force and side effects of knee OA.

## METHODS AND MATERIALS

This study was carried on the department of physical medicine and Rehabilitation at Dr. Sirajul Islam Medical College and Hospital LTD, Dhaka, Bangladesh. The study was duration from february 2019 to march 2021. On satisfying the incorporation standards and marking the educated assent structure, 88 patients with knee OA were enrolled as appropriate contender for intra-articular infusion in the present randomized, twofold visually impaired clinical preliminary. Consideration standards were age scope of 40–70 and stage 1 or 2 OA (in view of the Kellgren–Lawrence [KL] size of the Radiological Society of America); rejection models were rheumatoid joint pain or hemophilia, past history of knee medical procedure, medication or liquor

enslavement, and utilization of anticoagulant or nonsteroidal calming drugs (NSAIDs) in the past 7 days. The essential data, including age, sexual orientation, weight file (BMI), phase of KL, and X-beam examine were recorded for all patients.

In light of a past report, we determined the example size. In that review, the announced level of fulfillment in the PRP bunch at a half year was equivalent to 75% (0.75), while this rate was 10.8% (0.108) in the ordinary saline infusion bunch. At the point when we considered the alpha as 0.05 and beta as 0.1, with force of 95%, we determined an example size equivalent to 13 in each gathering. We at last enlisted 42 patients in each group.<sup>[18]</sup>

We utilized a square randomization strategy (block size of four) for figuring out which patient ought to be allocated to which bunch. Randomization stayed solid during the investigation.

After confirmation of patients to the working theater, the patient's knee condition was assessed based on the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). The WOMAC estimates five things for torment (score range 0–20), two for firmness (score range 0–8), and 17 for practical constraints (score range 0–68). Consequently, the conceivable WOMAC score is somewhere in the range of 0 and 96.<sup>[4]</sup>

Following routine checking measures, for example, inspecting pulse, pulse, and an electrocardiogram, a 20-mL blood test was drawn under sterile conditions and set in particular axis units for the planning of PRP (Standard pack, Iran). Then, at that point, the blood was centrifuged for 20 minutes at a pivot speed of 3,200 rpm. The plasma was isolated and recentrifuged for 5 minutes at a revolution speed of 1,500 rpm. Then, at that point, 7 mL of the isolated plasma was ready for intra-articular infusion for patients in the PRP treatment bunch. Patients in the PRL bunch got 7 mL 25% dextrose.

After organization of neighborhood sedation and situation of a multi-recurrence straight test of (6–13 MHz with a profundity of 6 cm) a ultrasound machine (Sonosite, S-Nerve, South Korea) at the highest point of the patella, the intra-articular infusion was managed under sterile conditions. Then, at that point, a 50 mm-long 22-check needle (Visioplex needle, Vygon Company, France) was embedded into the knee joint at the upper external quadrant of the patella under ultrasonographic direction through the Inplane procedure. Then, at that point, the pre-arranged arrangement was infused into the knee joint; this was finished with each understanding, with neither the patient nor the doctor mindful of the substance of the needles. Patients stayed under clinical consideration for an hour and were then released if no confusions were identified. A similar technique was rehashed multi month after the

fact for all patients. If there should arise an occurrence of postprocedural torment, paracetamol was recommended.

Utilizing the WOMAC, levels of agony and knee work were assessed and recorded for every persistent at indicated time focuses – quickly preceding the main infusion, multi month after the fact (promptly before the subsequent infusion), after 2 months (a month after the subsequent infusion), and a half year after the fact. The agent and the information analyzer didn't know about quiet designation.

### Statistical analyses

Information gathered were investigated utilizing SPSS v. 20. We looked at the information and result factors (actual work, agony, solidness, and WOMAC) between treatment gatherings (PRP versus PRL) and in progressive meetings. In light of the idea of the factors (all are discrete factors) and number of classes, we utilized parametric tests for investigation of active work, agony, and WOMAC among gatherings and nonparametric tests for solidness. With respect to active work, agony, and WOMAC, we originally surveyed the ordinariness of information by the Kolmogorov–Smirnov test (K–S test) and verified that every one of them were regularly dispersed – in this manner, we utilized parametric tests for investigation. Moreover, we utilized blended model examination of difference (ANOVA) for

investigation of active work, agony, and WOMAC between two gatherings in progressive time meetings. The post hoc test was applied, and Bonferroni remedy was considered for translation of P-values. For examination of information from every treatment bunch in progressive meetings independently, we utilized rehashed measures ANOVA, and all pairwise correlations (for various time meetings) were cultivated. For examination of two treatment bunches in comparative time spans, we utilized the Student t-test. For solidness, we utilized nonparametric tests (Friedman test for correlation of various time meetings in every treatment gatherings) and Wilcoxon marked position test for pairwise examinations. Comparative time meetings between two treatment bunches were analyzed by Mann–Whitney U test. P-values were considered huge at <0.05, and they were deciphered based on Bonferroni adjustment. All standard information were thought about between bunches by chi-square, t-, and Mann–Whitney U tests. Ordinariness of information were evaluated by the K–S test from the start.

### RESULTS

84 patients (42 in each gathering) with knee OA were selected the investigation. No huge distinction was seen in segment and standard attributes between the two gatherings (**Table 1**).

**Table 1: Comparison of segment and gauge qualities between two gatherings.**

Patient demographic observe 1			P-value
Age/Year	PRP	65.5±6.62	0.53
	PRP	64.3±5.32	
BMI (kg/m <sup>2</sup> )	PRP	28.6±1.8	0.68
	PRP	28.3±1.9	
KL score	PRP	2.47±0.5	0.76
	PRP	2.42±0.5	
Sex (male/female)	PRP	10/11	0.76
	PRP	11/10	

**Briefness:** BMI, weight list; KL, Kellgren–Lawrence; PRL, prolotherapy; PRP, platelet-rich plasma.

The seriousness of knee OA was evaluated utilizing the patients' WOMAC scores (ie, the amount of useful restrictions, firmness, and agony level scores). There was

no genuinely critical between-bunch distinction with respect to the WOMAC score and its subscales (counting actual work [or practical limitation], agony, and solidness) before treatment when benchmark esteems were gathered (all P-values ≥0.73; **Table 2**).

**Table 2: Comparison of patient WOMAC scores and its subscales between two gatherings before the mediation.**

Patient WOMAC scores before the interversion 2			P- value
Functional limitations	PRL	47.3 6.5	0.81
	PRP	47.8 ±4.7	
Pain level	PRL	14.6 ±1.4	0.76
	PRP	14.8 ± 1.5	
Stiffness	PRL	5.2 ±1.3	0.73
	PRP	5.4 ±1.2	
WOMAC score	PRL	67.1 ±7.9	0.75
	PRP	67.9 ±7.34	

**Briefness:** PRL, prolotherapy; PRP, platelet-rich plasma; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.

Mean actual work (or utilitarian restriction) scores recorded at standard qualities are referenced in Table 3. As should be obvious, in the PRL bunch, the active work score dropped from 47.8 before treatment to 19.6 in the subsequent month and afterward rose to 22.8 in the 6th month. A comparable example was seen for PRP, for which the score dropped from 47.3 before treatment to 25 in the subsequent month to ascend to 27.8 in the 6th month. Exhaustively, all pairwise examinations of active work in various time-frames for the two gatherings were

measurably huge. Also, in the blended model ANOVA, the primary impact of time and communication of time with treatment bunch was measurably huge, while the P-esteem (0.11) of the fundamental impact of the treatment bunch was fringe. Given the way that an examination of two gatherings in comparative time meetings was measurably critical in the second and 6th months (better outcomes for PRP; and not huge at pretreatment and in the primary month), the marginal P-an incentive for the treatment bunch in the blended model ANOVA could be credited by one way or another to comparable aftereffects of actual work between the gatherings at months 0 and 1.

**Table 3: Comparison of actual work (useful constraint) between two gatherings in progressive months.**

Name 3	1 <sup>st</sup> month	2 <sup>nd</sup> month	6 <sup>th</sup> month	Re-measures test all	Comparisons
PRL	31±6.3	25±5.5	27.8±5.2	<0.001	All p-value were <0.001 except for comparison between (1vs 6) that was 0.004
PRP	30.3±7.6	19.6±7.2	22.8±7.9	0.001	All p-value were <0.001
P-value between group comparison in same time with ANOVA P-value	0.74	0.009	0.021		
Group					
Time					All p-value were <0.001
Time* group					

**Notes:** \*Pairwise examinations included correlations at various time meetings including preprocedural information (0), first-month information (1), second-month information (2), and 6th month information (6); these were as per the following: (0 versus 1), (0 versus 2), (0 versus 6), (1 versus 2), (1 versus 6), and (2 versus 6).

**Briefness ANOVA,** investigation of fluctuation; PRL, prolotherapy; PRP, platelet-rich plasma.

The mean agony scores at pattern have been referenced in Table 4. As should be obvious, in the PRL bunch, the agony score dropped from 14.6 before treatment to 7.1 in the subsequent month and afterward rose to 8 in the 6th month. A comparative example was seen for PRP; its score dropped from 14.8 before treatment to 5.4 in the

subsequent month and afterward rose to 6.2 in the 6th month. Exhaustively, all pairwise correlations of torment in various time-frames for the two gatherings were measurably huge. What's more, in blended model ANOVA, the fundamental impact of time and communication of time with treatment bunch was genuinely critical, while the P-esteem (0.056) of the primary impact of the treatment bunch was fringe. Given the way that the examination of two gatherings in comparative time meetings was genuinely critical in the second and 6th months (better outcomes for PRP, yet not in the pretreatment stage and at the primary month); the marginal P-an incentive for the treatment bunch in blended model ANOVA could be ascribed some way or another to comparative consequences of agony between the two gatherings at months 0 and 1.

**Table 4: Comparison of torment between two gatherings in progressive months.**

Name 4	Pretreatment	1 <sup>st</sup> month	2 <sup>nd</sup> month	6 <sup>th</sup> month	Re-measures test all	Comparisons
PRL	14.6± 1.4	9.5±2.3	7.1±1.7	8± 1.6	<0.001	All p-value were <0.001 except for comparison between (1vs 6) that was 0.004
PRP	14.8 ±1.5	9.2±2.7	5.4±1.8	6.2±2.1	0.001	All p-value were <0.001 except for comparison between (1vs 6) that was 0.015 &

						comparison between (2 vs 6) that was 0.022
P-value between group comparison in same time with ANOVA P-value	0.76	0.71	0.002	0.003		
Group	0.056					
Time	<0.001					All p-value were <0.001
Time* group	0.003					

**Notes:** \*Pairwise examinations included correlations at various time meetings including preprocedural information (0), first-month information (1), second-month information (2), and 6th month information (6); these were as per the following: (0 versus 1), (0 versus 2), (0 versus 6), (1 versus 2), (1 versus 6), and (2 versus 6).

**Briefness:** ANOVA, examination of change; PRL, prolotherapy; PRP, platelet-rich plasma.

The mean firmness score from the benchmark esteems have been referenced in Table 5. As should be obvious, in PRL bunch, the solidness score dropped from 5.2 before treatment to 2.6 in the subsequent month and afterward rose to 3 in the 6th month. A comparable

example was seen for PRP – the solidness score dropped from 5.4 before treatment to 2.1 in the subsequent month to ascend to 2.5 in the 6th month. Exhaustively, pairwise correlations of firmness for the PRL bunch at various time-frames were critical with the exception of the examination of first versus 6th and of second versus 6th month. For PRP, pairwise correlations at various time spans were all critical, with the exception of the second versus the 6th month which was fringe. What's more, pairwise correlation of comparable time meetings between the two gatherings showed that all distinctions were nonsignificant; in any case, the differentiation between the two gatherings in the second and 6th months were very fringe, and supported better outcomes for PRP.

**Table 5: Comparison of firmness scores between the two gatherings in progressive months.**

Name 5	Pretreatment	1 <sup>st</sup> month	2 <sup>nd</sup> month	6 <sup>th</sup> month	Re-measures test all	Comparisons
PRL	5.2 ± 1.3	3.2±1.1	2.7±0.7	3 ± 0.6	<0.001	All p-value were <0.001 except for comparison between (1vs2) that was 0.018. comparison between (1 vs 6) which was 0.28 and comparison between (2 vs 6) which was 0.14
PRP	5.4±1.2	3.3±1.1	2.1±0.7	2.5±0.8	0.001	All p-value were <0.001 except for comparison between (1vs 6) that was 0.015 & comparison between (2 vs 6) that was 0.071
P-value of between group comparison in similar time points	0.73	0.65	0.055	0.091		

**Notes:** \*Pairwise correlations included examinations at various time focuses including of preprocedural information (0), first-month information (1), second-month information (2), and 6th month information (6); these were as per the following: (0 versus 1), (0 versus 2), (0 versus 6), (1 versus 2), (1 versus 6), and (2 versus 6).

**Briefness:** PRL, prolotherapy; PRP, platelet-rich plasma.

The mean WOMAC scores at standard are accounted for in Table 6. In the PRL bunch, the WOMAC score dropped from 67.1 before treatment to 34.8 in the subsequent month, and afterward rose to 38.7 in the 6th month. A comparable example was seen for PRP, for which the score dropped from 67.9 before treatment to

27.1 in the subsequent month and afterward rose to 31.4 in the 6th month. Momentarily, all pairwise correlations of WOMAC in various time-frames for the two gatherings were genuinely critical. Moreover, in the blended model ANOVA, the principle impact of time and association of time with the treatment bunch was genuinely huge, though the P-esteem (0.097) of the fundamental impact of the treatment bunch was fringe. Given the way that the correlation of the two gatherings at comparable time meetings was genuinely critical in the second and 6th months (better outcomes for PRP, albeit not in the pretreatment and first month time focuses), the marginal P-an incentive for the treatment bunch in the blended model ANOVA could be ascribed some way or another to comparative consequences of WOMAC between the two gatherings at months 0 and 1.



**Table 6: Comparison of WOMAC between two gatherings in progressive months.**

Name 6	Pretreatment	1 <sup>st</sup> month	2 <sup>nd</sup> month	6 <sup>th</sup> month	Re-measures test all	Comparisons
PRL	67.1±7.9	43.8±8.2	34.8±6.9	38.7±6.6	<0.001	All p-value were <0.001 except for comparison between (2 vs 6) that was 0.003
PRP	67.9 ±7.3	42.9±10.85	27.1±9.1	31.4±10.2	0.001	All p-value were <0.001 except for comparison between (1vs 6) that was 0.015 & comparison between (1 vs 6) that was 0.002
P-value between group comparison in same time with ANOVA P-value	0.74	0.77	0.004	0.009		
Group	0.097					
Time	<0.001					All p-value were <0.001
Time* group	0.001					

**Notes:** \*Pairwise correlations included examinations at various time focuses including of preprocedural information (0), first-month information (1), second-month information (2), and 6th month information (6); these were as per the following: (0 versus 1), (0 versus 2), (0 versus 6), (1 versus 2), (1 versus 6), and (2 versus 6).

Shortened forms: PRL, prolotherapy; PRP, platelet-rich plasma; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.

## DISCUSSION

Different noninvasive and negligibly intrusive strategies have been utilized for the treatment of knee OA. The most predominant medicines are physical and recovery treatment, organization of NSAIDs and glucosamine, and, in the event of inadequacy with these fundamental measures, intra-articular infusion of hyaluronic corrosive, corticosteroid, PRP, PRL, and development chemical just as radiofrequency have been undertaken.<sup>[4,12]</sup> Several examinations have been directed to inspect the viability of PRP treatment in diminishing indications and agony related with OA,<sup>[15-18]</sup> Activated platelet brings about the arrival of certain go between, for example, development variables and cytokines. In vivo considers showed that PRP may cause expanded expansion and separation of chondrocytes too. Besides, PRP may have calming impacts through hindrance of the NF-κB pathway,<sup>[19]</sup> Each milliliter of PRP arrangement contains 1.5–2 million platelets, causing a 5-fold expansion in platelets and development factors. Hyperosmolar dextrose, as a PRL specialist, expands levels of PDGF. PRL goes about as an aggravation which has been demonstrated to be viable in the maintenance of connective tissue wounds. PRL is more successful than PRP treatment in the treatment of enthesitic inflammations.<sup>[20]</sup>

Consequences of the current preliminary demonstrated that PRP treatment is more viable than PRL over the long haul. Also, it was shown that PRP treatment can essentially diminish torment, useful impediments, and solidness in patients with knee OA for as long as 24 weeks. In this examination, the generally speaking WOMAC score improvement was 54%. At last, 60% of the analyzed patients encountered a half improvement during a 24-week time span. Truth be told, the improvement cycle had a vertical pattern for as long as about two months after the intercession, and the greatest improvement was seen in that period; from there on, there was a slight yet nonsignificant decrease in scores until Week 24. This may be because of an exorbitant utilization of the knee joint auxiliary to help with discomfort and is viewed as an underestimation of the outcomes. In this investigation, PRP treatment was more viable than PRL in working on the personal satisfaction of patients with knee OA.

Chang et al analyzed the impacts of PRP and hyaluronic corrosive infusion for knee agony and found that PRP infusion is more viable for patients with harmed articular ligament than was hyaluronic corrosive. In addition, patients with gentle OA reacted preferable to PRP infusion over those with serious OA.<sup>[5]</sup>

In a methodical survey, PRL gave a positive and critical helpful impact in the treatment of knee OA and, in the current investigation, PRL had huge adequacy as well.<sup>[20]</sup> Intra-articular infusion of PRP has actuated a huge decreasing of degenerative articular fiery changes. Momentary impacts of PRP in the treatment of knee OA have been inspected in past examinations. These examinations demonstrated that PRP infusion is more viable than hyaluronic corrosive and fake treatment infusions. Another examination analyzed the impacts of a solitary portion of PRP infusion with corticosteroid infusion on the seriousness of knee OA manifestations

and showed that PRP lessens joint torment indeed and for a more drawn out length. In the previously mentioned study,<sup>[16,21]</sup> agony and OA seriousness were estimated through the visual simple scale, while a more far reaching measure apparatus (ie, the WOMAC) was utilized in the current examination. In another investigation, a huge distinction was accounted for among PRP and hyaluronic corrosive gatherings of patients with WOMAC scores, where patients treated by PRP infusion showed better practical scores. In an efficient audit, the organization of PRP was looked at against that of corticosteroids, hyaluronic corrosive, oral NSAIDs, and fake treatments. The outcomes showed that PRP is a compelling treatment for knee OA, even as long as a year. By the by, the incessant utilization of PRP infusion expands the chance of unfriendly reactions.<sup>[21-23]</sup> Studies have shown that the utilization of development variables can be compelling in the treatment of restricted ligament deserts, for example, in OA. In spite of the fact that, there is as yet a requirement for additional exploration around here, it has been demonstrated that the insufficiency of the development chemical expands the seriousness of articular ligament pathology in patients with OA.<sup>[4,8]</sup> According to the aftereffects of this investigation and past examinations, PRP infusion can be helpful for OA patients whose knee condition has not been improved by means of other restorative systems, like physiotherapy, practice treatment, and different prescriptions or infusions.

This examination had a few impediments, for example, absence of a benchmark group getting fake treatment; absence of morphological evaluation of ligament, delicate tissue, and designs in and around the knee joint; little example size; and restricted time period for patient appraisal. PRP treatment needs a rotator machine and explicit packs and, subsequently, costs are higher than for PRL; hence, choices about the utilization of this more costly treatment should be made appropriately.

## CONCLUSION

In the current investigation, contrasted with PRL, PRP infusion was more powerful in diminishing agony, firmness, and utilitarian limits in OA patients following 2 months and for as long as a half year of follow-up. No huge results was noticed.

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