Print ISSN: 2321-6379
Online ISSN: 2321-595X

Original Article

Platelet-Rich Plasma versus Injectable Platelet-Rich Fibrin – A Randomized Control Trial

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Abstract

Introduction: Platelet-rich plasma (PRP) is a source of growth factors derived from a platelet concentrate obtained by centrifugation and is being used in hair regrowth in patients of androgenetic alopecia (AGA). Injectable-platelet-rich fibrin (iPRF) is advanced version of platelet-rich fibrin in liquid form which can be injected and contains stem cells with high regenerative potential.

Objectives: The objectives of this study were to study the effect of PRP and iPRF in patients suffering from AGA. A study was done between Group A (PRP) and Group B (iPRF) and effects on hair growth, hair loss, and the total duration, for which results remained was done.

Materials and Methods: Fifteen patients in each Group A (PRP) and Group B (iPRF) underwent monthly administration, for a total 3 months duration.

Results: Hair density increased by18% at 3 months after applying PRP. Hair density increased by 24% at 3 months after applying iPRF. It was maintained 6 months after receiving treatment (mean 185.53 ± 68.20 hairs/cm^2) in PRP group, and (mean 198.53 ± 68.20 hairs/cm^2) in iPRF group.

Conclusion: Both PRP and iPRF can be used in treatment of hair loss in men, but iPRF has better results. However, further studies are required to prove its correct efficacy.

Key words: Alopecia, Growth factors, Hair regrowth, Injectable-platelet-rich fibrin, Platelet-rich plasma, Regeneration, Stem cells

INTRODUCTION

Androgenetic alopecia (AGA) is characterized by progressive miniaturization of hair follicles in the scalp. In men, it is due mainly to androgens and genetic predisposition. Progressive hair loss, leading to bald patches on the scalp, occurs in 50–60% of men at the age of 70 years.[1,2] Oral finasteride and topical minoxidil are the currently approved therapeutic options, but both are associated with side effects, and there is a need for a newer treatment modality.

Platelet-rich plasma (PRP) is a 3 to 8 times platelet-enhanced product of plasma. Platelets contain a variety of growth factors including transforming growth factor-β, VEGF, platelet-derived growth factor, insulin-like growth factor, and epithelial growth factor.[3]

Platelet-rich fibrin (PRF) contains accumulated platelets and the released cytokines in a fibrin clot.[4] Advanced-PRF™ (A-PRF™) and injectable-PRF (i-PRF) are different from conventional PRF and are based on the concept that low speed of centrifugation yields maximum results and significantly higher number of leukocytes, platelets, and growth factor concentration-enhancing the regeneration process.

Access this article online

www.ijss-sn.com

Month of Submission : 04-2022
Month of Peer Review : 05-2022
Month of Acceptance : 05-2022
Month of Publishing : 06-2022

MATERIALS AND METHODS

The study was done as a randomized control trial in patients attending outpatient department clinic at Shafia Skin Centre and Dr Rizvi's Multispeciality Clinic.

Thirty patients under 45 years of age were screened with diagnosis of AGA and no known history of malignant

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neoplasms, acquired immunodeficiency syndrome, hepatitis B, hepatitis C, or susceptibility to keloid scarring. Furthermore, none of the patients were receiving longstanding non-steroidal anti-inflammatory drugs or had active skin lesions in the areas affected by AGA. According to the Norwood–Hamilton classification, cases were divided as type I to type VII. Fifteen patients were treated with PRP and other 15 with iPRF. The baseline platelet count in patients had to be >140,000 platelets/μL. PRP and iPRF were done at 1 month interval and results were noted at the end of 3 months in both the group. Each patient was examined to locate the area with lowest hair density.

An area 1 cm^2 was marked and the hair in that area shaved. A metric tape measure graduated in centimeters was used to mark the square centimeter and the longitudinal distance from the corresponding end of the eyebrow or nasal root was measured. The image of the area was then amplified using a portable dermatoscope and a photograph was taken before each injection. This photograph was then magnified to permit manual counting.

PRP Preparation

PRP was prepared under sterile conditions, taking an 20 mL sample of peripheral blood through a scalp vein catheter and dividing it into 10 ml each and then transferred into a 10 ml tube that contained 1 mL of sodium citrate 3.8% and then centrifuged in a swing out rotor centrifuge (Remi Centrifuge) at 3000 rpm for 20 min.

PRF Preparation

iPRF was prepared under sterile conditions, taking a 20 mL sample of peripheral blood through a scalp vein catheter and dividing it into 10 ml each and then transferred into a 10 ml plain tube (without any anticoagulant) centrifuged in a swing out rotor centrifuge at 700 rpm for 4 min. iPRF is yellow-reddish fluid collected at the top and is separated by a dark layer at the bottom. Each 10 ml of whole blood gives 1 ml of iPRF.

Preparation of Scalp

Patients were advised to clean there scalp with shampoo at the day of PRP or iPRF therapy. The scalp is cleaned with betadine and a eutectic mixture of cream containing 2.5% of lignocane and prilocaine each was applied on the scalp for 40 min, to get the anesthetic effect. Thereafter, the scalp is cleaned with sterile gauze piece. PRP and iPRF are filled in insulin syringes and intradermal injections at a distance of 1 cm are given on scalp. A vibrator is inserted in a glove to keep the field sterile post procedure, patients were asked not to wash their head for 8 h, and to avoid exposure to sun or dust, and cover their head and restrict heavy weightlifting for 2 days. Paracetamol 650 mg was given if any patient complained of pain at injection site.

RESULTS

Thirty men with diagnosis of AGA were selected and enrolled in the study between September 2019 and March 2022. None were excluded from the study. Our study cohort comprised patients aged between 17 and 42 years (mean 26.7 ± 4.7 years). Stage 3 and 3 vertex, according to the Norwood scale, were the most frequent patterns (eight patients each, that is, 26.7%). Twenty-eight patients (93.3%) had a family history of AGA. Hair density increased by 18% at 3 months after applying PRP (165.0 ± 21 hairs/cm^2 before treatment to 194.0 ± 51 hairs/cm^2 after 3 months). This increase was significant and maintained 6 months after receiving treatment (mean 185.53 ± 68.20 hairs/cm^2, Friedman test, $P < 0.0001$) [Figures 1 and 2].

Hair density increased by 24.% at 3 months after applying iPRF (165.0 ± 21hairs/cm^2 before treatment to 204.0 ± 51 hairs/cm^2 after 3 months). This increase was also significant and maintained 6 months after receiving

Figure 1: Before and after 6 months of treatment

Figure 2: Before and after 6 months of treatment

Figure 3: Before and after 6 months of treatment

Figure 4: Before and after 6 months of treatment

treatment (mean 198.53 ± 68.20 hairs/cm^2, Friedman test, $P < 0.0001$) [Figures 3 and 4]. Side effects of both included tolerable injection site pain during each injection and minimal bleeding. There was no difference in pain or bleeding in both the groups. In our cohort, an increase in hair density by 10–20% was the outcome observed with greatest frequency (in 33% of patients [5/15]). In addition, in 6.7% of patients (2/30), an increase of more than 50% in hair density was observed [Figures 3 and 4]. However, at 6 months after performing the PRP injection, a decrease was demonstrated in hair density in 13.3% of patients (4/30) [Table 1]. In addition, we observed a correlation between efficacy of the application of PRP and type of AGA (Fisher exact test, $P = 0.04$). The pattern with least response was stage 3 vortex (only 37.5% of patients responded positively). However, the efficacy rate was 100% for stages 1, 3, and 4; 83.33% for stage 2; and 75% for stage 5. There was no correlation between a favorable response and patient age (Fisher exact test, $P = 0.5$) or duration of AGA (Fisher exact test, $P = 0.7$) [Table 2].

Table 1: Result in PRP group

Percentage Increase	Number of patients	Percentage
<10	2	13.3
10–20	6	39.6
20–50	4	26.4
>50	1	6.6
Decrease after 6 months	2	13.3

Table 2: Result in iPRF group

Percentage Increase	Number of patients	Percentage
<10	2	13.2
10–20	4	26.4
20–50	7	46.2
>50	1	6.7
Decrease	1	6.7

DISCUSSION

There are various treatment options available to treat AGA, such as, hair transplant, medications such as finasteride, and Minoxidil with low-level laser light therapy.[5] Most studies[6,7] using PRP for hair growth have shown good results, but the emerging iPRF uses as a treatment modality needed to be quantitated against the former. Masuki *et al.*[8] stated that A-PRF has a high concentration of white blood cells (WBCs) and platelets, whereas in PRP inflammatory cytokines were not present in high levels and there was no positive correlation between WBC counts and pro-inflammatory cytokine observed. Based on their study, authors concluded that i-PRF contains a higher amount of growth factors as compared to PRP, which not only functions as a scaffold but also a reservoir of growth factors.

Both PRP and PRF are platelet concentrates; however, double centrifugation processes, the addition of anticoagulants. PRF is one such platelet concentrate which requires one spin and does not use anticoagulants for its procurement.[1] Its three-dimensional fibrin network mimics the extracellular matrix in terms of its structure,[9] which creates the environment for cells to function optimally.

CONCLUSION

From the above study, it can be concluded, that both PRP and iPRF can be used for hair growth in patients with AGA. They both have a good result in, reducing hair fall, increasing hair density and have a good safety profile. Clearly, iPRF has better result than PRP in all the patients, and the results are also sustained for a long time. However, further studies are required to demonstrate its correct efficacy.

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How to cite this article: Mohamamad A, Rizvi SA. Platelet-Rich Plasma versus Injectable Platelet-Rich Fibrin – A Randomized Control Trial. Int J Sci Stud 2022;10(3):53-56.

Source of Support: Nil, **Conflicts of Interest:** None declared.