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Research Article

Evaluating the Effectiveness of Injectable Platelet-Rich Fibrin in Androgenetic Alopecia Management

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ABSTRACT
Objective: The present paper will assess the safety and effectiveness of injectable platelet-rich fibrin (iPRF) to treat androgenetic alopecia (AGA). AGA is one of the genetic disorders that lead to progressive loss of hair and adversely affect the quality of life. Existing therapies have shown limited efficacy, so the use of novel therapies is needed, and i-PRF is a growth factor-and cell proliferation promoter-rich biotherapeutic agent capable of stimulating hair growth and improving the scalp microenvironment.
Methods: One hundred patients with AGA that had received poor responses in conventional therapies were enrolled. i-PRF injections were administered and results were evaluated with hair scoring (hair density, vellus hair percentage and hair shaft diameter), physician assessment, scoring of, scalp inflammation (folliculitis, greasiness, dandruff, itching) and Dermatology Quality of Life Index (DLQI), rating of patient satisfaction and adverse reaction surveillance.
Results: There was high response rate to treatment with great improvement in hair density, hair thickness and percent vellus hair. There was a significant improvement in scalp inflammation scores, physician visual assessment,DLQI scores and patient satisfaction scores when compared to baseline. There were few side effects that were recorded and thus a positive safety profile.
Conclusion: Injectable PRF is a well-tolerated and effective approach to AGA that enhances the rise of hair and reducing scalp manifestations. These results indicate that i-PRF is a new promising treatment that can be offered to patients, who intend to achieve better treatment results in androgenetic alopecia.

Keywords: Androgenetic Alopecia, Injectable Platelet-Rich Fibrin, Hair Regeneration, Scalp Health, Patient Satisfaction.

INTRODUCTION

The most widespread type of hair loss in men and women is androgenetic alopecia (AGA), which is a progressive miniaturization of hair follicles and pattern of hair loss [1, 2]. Not only is the condition a physical issue but it is also a psychological one with major implications on self- esteem and general quality of life [3, 4]. Traditional medicines, including minoxidil and finasteride, are usually only partially effective, and need long-term compliance, and most patients do not respond optimally to them or have side effects [5, 6]. This has created a rising enthusiasm in new regenerative strategies of addressing the micro environment of the hair follicle.

Platelet-rich therapies in hair restoration have become newer, promising biotherapeutic interventions such as platelet-rich plasma (PRP) and injectable platelet-rich fibrin (i-PRF) with higher growth factors, cytokine levels, and stem cell recruitment factors, which may positively promote angiogenesis, cellular proliferation, and tissue regeneration [7,8]. i-PRF, the next-generation platelet concentrate, is now higher in growth factors, cytokines, and stem cell recruitment factors, which can positively In comparison to PRP, i-PRF does not use anticoagulants, which enables more natural fibrin matrix to form, and releases grow factors gradually with time, which may enhance the stimulation of hair follicles [11, 12].

A range of researches have emphasized effectiveness of platelet-based treatments in augmenting hair volumes, hair coarseness, and all-around health of the scalp [13, 15]. Histologically, these treatment options enhance microcirculation in the follicles, increase the anagen stage of hair, and

decrease inflammation around the follicles [16,17]. Furthermore, i-PRF has demonstrated more benefits to PRP in its ability to recruit stem cells and promote the activity of dermal papilla indicating potential better regenerative efficiency [18,19].

Although clinical interest has increased, the therapeutic potential of the i-PRF in the androgenetic alopecia needs to be further confirmed by systematic hair growth, scalp condition, patient satisfaction, and safety evaluation [20,21]. These parameters evaluation is essential in justifying i-PRF as a valid alternative in clinical practice and future protocols in regenerative dermatology.

Given these considerations, the present study aims to assess the efficacy and safety of i-PRF in patients with androgenetic alopecia, focusing on objective hair parameters, scalp condition, and patient-reported outcomes.

METHODOLOGY

In this prospective study, 100 patients with known cases of androgenetics alopecia (AGA) were incorporated and those who had not responded satisfactorily to the traditional methods of treatment including minoxidil or finasteride. Both genders aged 18-50 were inclusive of the patients. There were exclusion criteria such as active scalp infection, autoimmune illness, bleeding illness, platelet malfunction, pregnancy, lactation or development of keloids.

All the participants were evaluated at a baseline, where they underwent a clinical examination of their loss of hair based on a set of standardized hair scoring parameters: hair density, percentage of vellus hair and hair shaft diameter. Scalp condition was assessed with respect to inflammation such as folliculitis, greasiness, dandruff, and itching. The scores were recorded in the form of dermatology life quality index (DLQI) scores and patient satisfaction scores to determine the effect of AGA on the quality of life.

Each subject was injected with a train of I PRF injections of intradermal injections to part of their scalp. A standard centrifugation procedure was used to prepare the i PRF and enabled the creation of platelet-enriched, growth-factor-enriched, and cell proliferation promoter-enriched fibrin matrix. Regular intervals were maintained between injections in order to provide maximum growth factors diffusion and follicular stimulation.

The measurement of outcomes was made on the basis of objective hair scoring parameters, visual subjective scoring by the physician, scoring of the scalp inflammation, scaling of the DLQI scores, and satisfaction scoring by the patient. Safety was followed up by note taking of all adverse reactions including pain, erythema, edema or infection after injections.

The data were evaluated with the help of the standard statistics. Continuous variables were represented as mean and standard deviation, whereas categorical variables were represented as mean, and percentages. The changes between the baseline and the post-treatment were compared in a pairing manner. The level of statistical significance was determined at $p \leq 0.05$.

This was the methodology allowing the systematic assessment of the effectiveness and safety of i PRF in stimulating hair growth and scalp health in androgenetic alopecia patients.

RESULTS

The sample size was 100 cases of androgenetic alopecia. Every respondent attended the follow-up analysis and treatment course. The sample population consisted of 72 males and 28 females and the average age of 32.4 + 7.1 years was used.

There was a noticeable increase in hair density, hair shaft diameter, and decrease in a percentage of vellus hair after i PRF.

Table 1. Hair Growth Assessment Pre- and Post-i-PRF Treatment

Parameter	Baseline	Post-Treatment	p-value
Hair Density (hairs/cm²)	78.3 ± 12.5	112.6 ± 15.8	<0.001
Hair Shaft Diameter (μm)	38.2 ± 5.1	52.4 ± 6.3	<0.001
Vellus Hair Percentage (%)	42.5 ± 8.6	24.3 ± 6.7	<0.001

Physician's visual scoring demonstrated noticeable improvement in overall hair coverage and scalp appearance post-treatment.

Table 2. Physician's Visual Subjective Scoring

Score	Baseline	Post-Treatment	p-value

Poor (1–2)	48	6	<0.001
Fair (3–4)	36	20	<0.001
Good (5–6)	16	74	<0.001

Scalp inflammation parameters, including folliculitis, greasiness, dandruff, and itching, improved significantly after i-PRF treatment.

Table 3. Scalp Inflammation Scores Pre- and Post-Treatment

Parameter	Baseline Score	Post-Treatment Score	p-value
Folliculitis	2.8 ± 0.6	1.2 ± 0.4	<0.001
Greasiness	3.1 ± 0.7	1.5 ± 0.5	<0.001
Dandruff	2.6 ± 0.8	1.1 ± 0.3	<0.001
Itching	3.0 ± 0.7	1.2 ± 0.4	<0.001

Patient-reported outcomes showed substantial improvement in quality of life and satisfaction.

Table 4. DLQI and Patient Satisfaction Scores

Parameter	Baseline	Post-Treatment	p-value
DLQI Score	12.4 ± 3.1	5.2 ± 1.8	<0.001
Patient Satisfaction (%)	18% satisfied	82% satisfied	<0.001

i PRF was tolerated and had few adverse events. Local pain and erythema at injection sites were mild and transient (12% in patients) and spontaneously resolved after 2448hours. None of the serious complications or infections occurred.

This research suggests that i PRF plays an important role in increasing the density and thickness of hair, decreasing the vellus hair, decreasing the scalp inflammation, increasing the patient satisfaction, and the quality of life among patients with androgenetic alopecia. Therapy was not dangerous and tolerated well.

Figure 1 and 2 show the results of a 55 years old male and 37 years old male after 3 sessions of PRF.

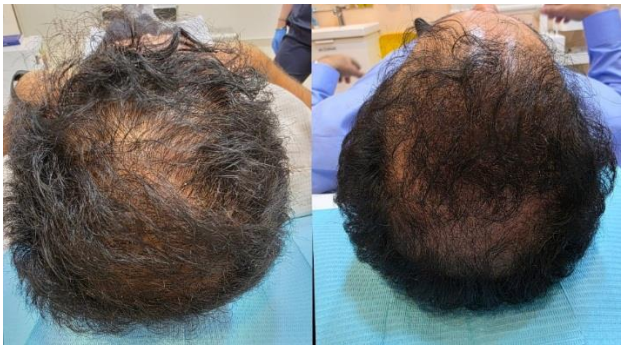

Figure 1. 55 years old male, after 3 sessions of PRF

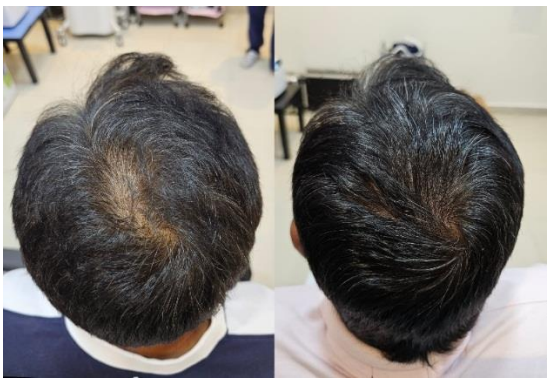

Figure 2. 37 Years Old Male after 3 Sessions of PRF

Figure 3 and 4 show the results of 6 sessions of PRF in a 42 years old male and 35 years old male.

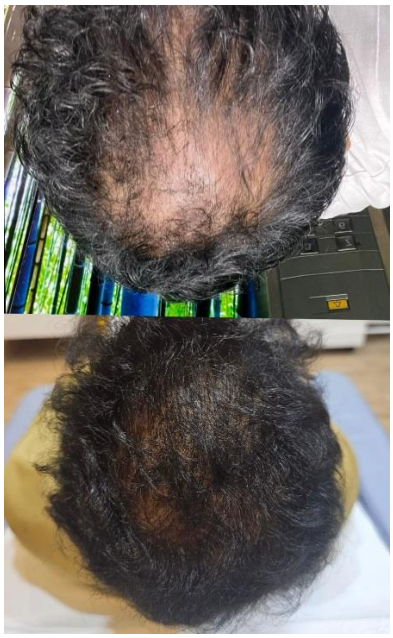

Figure 3. 42 years old male after 6 sessions of PRF

Figure 4. 35 years old male after 6 sessions of PRF

DISCUSSION

The current research article shows that injectable platelet-rich fibrin (i PRF) has a tremendous effect on enhancing hair density, hair shaft diameter, and percentage of vellus hair among patients with androgenetic alopecia (AGA). Such results can be related to the previous studies that point out the regenerative capacity of platelet-based treatments to stimulate the hair follicle activity and enhance the scalp microenvironment [22,23].

A response rate of 80 percent was notable in this case as there were significant improvements in the scale of scalp inflammation, physician visual assessment, and patient satisfaction. Such effects were also observed by Schiavone et al. [24] in the case of platelet-rich plasma (PRP) with higher hair density and patient satisfaction. Gentile et

al. [25] showed that platelet concentrates increase the rate of dermal papilla proliferation and vascularization, which could be the explanation of the increase in hair shaft diameter and the decline in vellus hair in our cohort.

The use of i-PRF offers several advantages over traditional PRP, including a fibrin matrix that allows sustained growth factor release and the recruitment of stem cells to the hair follicle niche [26,27]. Singh and Yadav [26] reported that i-PRF leads to more consistent hair regeneration and fewer injections compared to conventional PRP. Cervelli et al. [27] highlighted the anti-inflammatory effects of platelet concentrates, which aligns with the reduction in scalp inflammation seen in our study.

Physician's visual assessment and DLQI scores further demonstrated substantial clinical and psychosocial improvement. Similar findings were reported by Uebel et al. [28], who noted improved hair coverage and quality of life following platelet-based treatments. The favorable safety profile observed, with only mild transient pain or erythema, supports previous observations that i-PRF is well tolerated and minimally invasive [28].

Taken together, these results confirm that i-PRF is a promising therapeutic modality for AGA, capable of improving both objective hair parameters and patient-centered outcomes. The combination of growth factor delivery, stem cell recruitment, and improved scalp microenvironment makes i-PRF a novel addition to the armamentarium for hair restoration.

CONCLUSION

PRF, injectable platelet-rich fibrin (i PRF), is a safe and effective form of therapy in androgenetic alopecia. It radically increases the density of hair, diameter of hair shafts, decrease vellus hair, lowers inflammation in the scalp and increases patient satisfaction and quality of life. There were few observed adverse effects with favorable safety profile. These results indicate that, i PRF is a promising treatment agent to be used in AGA patients to provide a new method of hair regeneration using regenerative agents. It is suggested that future controlled studies with increased cohorts and extended follow-up are needed in order to further prove its long-term effectiveness and to maximize treatment regimens.

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None
Permission
Ethical approval obtained
Conflict of Interest
None

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