Original Research Article　　　　　　　　　　　　　　　　　　**Dermatology**

The Efficacy of PRP Injection in Treating Androgenic Alopecia in Male

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Abstract

Background: Androgenic alopecia (AGA), commonly referred to as male pattern baldness, represents a prevalent condition characterized by hair loss in men worldwide. While genetic factors primarily influence AGA, hormonal imbalances, particularly involving androgens, play a significant role in its pathogenesis. Platelet-Rich Plasma (PRP) therapy has emerged as a promising treatment option for AGA in males, offering hope for effective solutions for hair loss. ***Objective:*** To evaluate the effectiveness of PRP injections in the treatment of androgenic alopecia in males. ***Methodology:*** In this prospective study spanning January 2023 to January 2024, 30 male patients with androgenic alopecia (AGA) were enrolled. Diagnosis relied on clinical evaluation, with AGA staging based on the Norwood-Hamilton scale. Patients underwent baseline blood workup and received four PRP injection sessions every three weeks. Visual assessments, digital photography, and a hair pull test were conducted at specified intervals. PRP was prepared from peripheral blood using centrifugation and activated with calcium chloride before injection into affected scalp areas using the nappage technique. Data analysis employed SPSS software, with continuous variables expressed as mean $\pm$ SD and categorical variables as numbers and percentages. Fisher's exact test was used for qualitative data analysis, with significance set at $p < 0.05$. The study aimed to evaluate the effectiveness of PRP injections in treating AGA in males. ***Results:*** The study population's age distribution showcases a varied demographic, with the majority falling within the 28 to 47-year-old range, particularly dominant in the 38-47 years group (50%), followed by 28-37 years (36.67%), while individuals aged 18-27 years represent 13.33% of the total participants. In terms of male pattern baldness, the Modified Norwood Hamilton classification reveals a predominant presence of moderate to slightly advanced stages, with Grade III being the most prevalent (23.30%), followed by IIIa (16.67%) and IIa (16.67%). Additionally, Grade II accounts for 10% of the population, while the more severe stages, IV and IVa, collectively make up 18.50%. At baseline assessment, the majority of patients exhibited moderate hair loss (75%), with mild hair fall noted in 20% and severe hair fall in 5% of the cohort. Over the course of the study, visual assessment on a 7-point scale demonstrated a progressive improvement, with initially all participants showing no change, which decreased to 26% by the 4th month, accompanied by increasing percentages of mild (40.6% at 4th month), moderate (29.6% at 4th month), and excellent (3.7% at 4th month) improvements. Analysis of improvement in the fronto-temporal region compared to the vertex region indicated differences in distribution but lacked statistical significance across categories of improvement (p-values ranging from 0.15 to 1.00), with moderate improvement being more prevalent in the vertex region (50%) compared to the fronto-temporal region (23.8%). ***Conclusion:*** PRP therapy offers a straightforward and cost-effective approach to treating AGA in males. With high patient satisfaction rates and minimal adverse effects, PRP presents itself as a viable option for individuals who have not responded satisfactorily to conventional treatments.
Keywords: Androgenetic alopecia (AGA), Platelet-Rich Plasma (PRP) injections, Hair loss.

INTRODUCTION

Androgenic alopecia (AGA), commonly known as male pattern baldness, is a prevalent condition characterized by hair loss in men worldwide. This condition often manifests as a progressive thinning of hair, leading to a receding hairline and balding at the crown [1-2]. While primarily influenced by genetic factors, hormonal imbalances, particularly involving androgens, play a significant role in its pathogenesis [3].

Platelet-Rich Plasma (PRP) therapy has emerged as a promising treatment option for AGA in males, offering hope for those seeking effective solutions for hair loss. PRP therapy involves the extraction and concentration of platelets and growth factors from the patient's blood, which are then injected into the scalp to stimulate hair follicle regeneration and promote hair growth [4-5].

The application of PRP injections in treating AGA has gained considerable attention due to its minimally invasive nature and potential efficacy. Unlike conventional treatments such as topical medications or oral medications, PRP therapy harnesses the body's natural healing mechanisms to rejuvenate hair follicles and stimulate hair growth [6-7].

Research into the effectiveness of PRP injections for AGA in males has yielded promising results, with studies reporting improvements in hair density, thickness, and overall hair growth. [8] However, the efficacy of PRP therapy in treating AGA remains an area of ongoing investigation, with the need for further research to validate its long-term benefits and optimal treatment protocols.

Despite the promising potential of PRP therapy, it is essential to recognize that individual responses to treatment may vary, and not all patients may experience the same degree of improvement. Additionally, factors such as age, severity of hair loss, and underlying medical conditions may influence treatment outcomes.

Objective
To evaluate the effectiveness of PRP injections in the treatment of androgenic alopecia in males.

METHODOLOGY

This prospective unicentric observational study spanned one year, from January 2023 to January 2024, involving 30 male patients diagnosed with androgenic alopecia (AGA). Sample size determination utilized the formula for population proportion, with a study power of 80%, precision alpha of 0.05, and a 95% confidence interval. Diagnosis of AGA relied on clinical evaluation, with staging based on the modified Norwood-Hamilton scale. Inclusion criteria comprised males aged 18 to 50 with AGA grading II to V and no recent treatment. Exclusion criteria encompassed coagulopathies, anticoagulant or anti-platelet medication use, other alopecia types, keloidal tendencies, dermatoses, and drug-induced alopecias. Before the procedure, baseline blood workup included a complete blood count, coagulation profile, blood sugar, HIV, Hepatitis B, and Hepatitis C screening. Patients received four PRP injection sessions every three weeks, with visual assessments and digital photography conducted at specified intervals.

A hair pull test, conducted at baseline and each visit, involved firmly grasping and tugging hairs from the scalp. A positive test indicated active hair fall (>10% hairs pulled away from the scalp). Peripheral blood (16ml) was collected aseptically and processed using a centrifuge, yielding platelet-rich plasma (PRP) for injection into the scalp. PRP activation involved calcium chloride addition before injection into affected areas using the nappage technique.

Data analysis was performed using SPSS software, with continuous variables expressed as mean ± SD and categorical variables as numbers and percentages. Fisher's exact test analyzed qualitative data, with significance set at $p < 0.05$.

RESULTS

The study group's age distribution reveals a diverse range, with the majority falling between 28 to 47 years old. Specifically, individuals aged 28-37 years constitute the largest portion at 36.67%, closely followed by those aged 38-47 years, comprising 50% of the group. Meanwhile, individuals aged 18-27 years represent 13.33% of the total participants, indicating a smaller but still notable presence in the study.

Table-1: Age distribution of the study group

Age Group	n	%
18-27 years	4	13.33%
28-37 years	11	36.67%
38-47 years	15	50%

The distribution of the study population based on the Modified Norwood Hamilton classification reveals a varied pattern of male pattern baldness progression. The majority fall within the III category, constituting 23.30% of the population, followed by IIIa at 16.67% and IIa at 16.67%, indicating a significant presence of moderate to slightly advanced stages of hair loss. Additionally, Grade II accounts for 10% of the population, while the more severe stages, such as IV and IVa, collectively make up 18.50%. The least represented categories are V and III-vertex, each comprising 2.86% and 12% respectively.
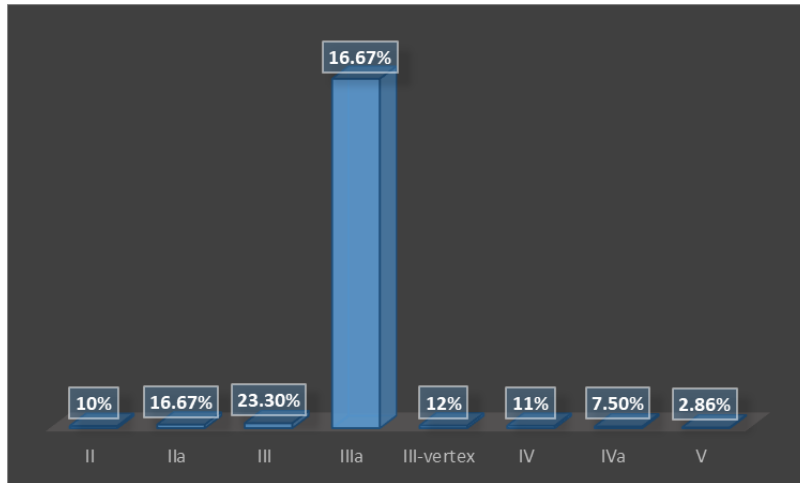
Figure-1: Distribution of the study population based on Modified Norwood Hamilton classification

At baseline assessment, the patients exhibited varying degrees of hair fall, with the majority experiencing moderate hair loss, accounting for 75% of the cohort. A notable portion reported mild hair fall, comprising 20% of the population, while a smaller fraction described severe hair fall, representing 5% of the patients.
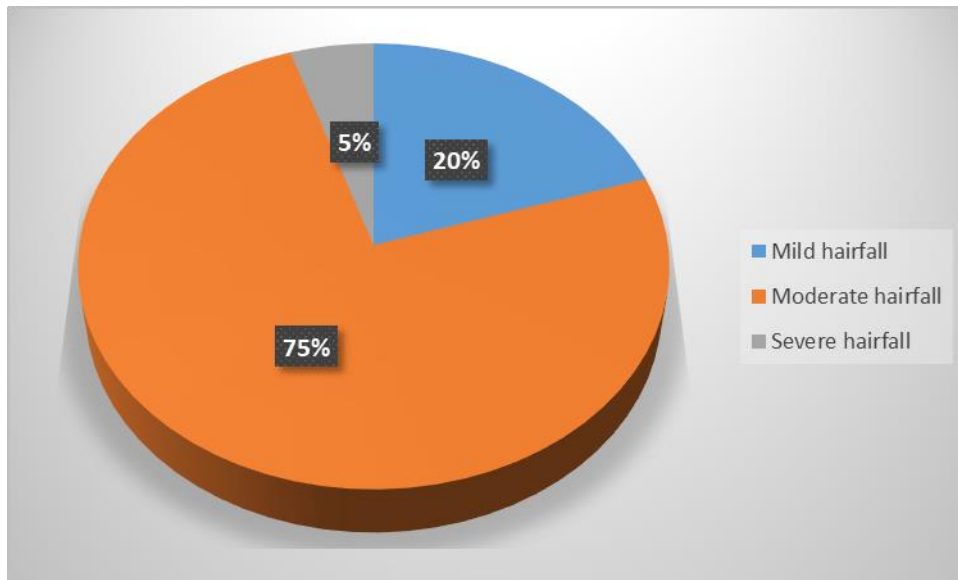

Figure-2: Patient's assessment at baseline

The visual assessment of improvement over the course of the study, measured on a 7-point scale, indicates a notable trend towards improvement among participants. Initially, at the 3rd week, all participants showed no change in hair condition. However, by the 6th week, a significant portion, 82%, exhibited no change, while 18% showed mild improvement. Subsequent assessments at the 9th week and 4th month revealed a considerable shift, with a decreasing percentage of participants reporting no change (37% and 26% respectively) and increasing percentages showing various degrees of improvement, including mild (61% and 40.6%), moderate (3.7% and 29.6%), and excellent (3.7% in both instances). This pattern suggests a progressive and increasingly positive response to the treatment intervention over time.

Table-2: Visual assessment of improvement on a 7-point scale

Assessment of improvement	3rd week	6th week	9th week	4th month
No change	100%	82%	37%	26%)
Mild improvement	0	18%	61%	40.6%
Moderate improvement	0	0	3.7%	29.6%
Excellent improvement	0	0	3.7%	3.7%

In the fronto-temporal region, 33.3% of participants showed no change, whereas no participants reported no change in the vertex region. However, this difference was not statistically significant (p = 0.15). Regarding mild improvement, the fronto-temporal region had a slightly higher percentage (42.9%) compared to the vertex region (30%), although this disparity did not reach statistical significance (p = 1.00).

Conversely, moderate improvement was more prevalent in the vertex region (50%) compared to the fronto-temporal region (23.8%), though again not statistically significant (p = 0.32). Lastly, excellent improvement was observed in 20% of the vertex region participants, while no participants in the fronto-temporal region exhibited this level of improvement, but the difference was not statistically significant (p = 0.22).

Table-3: Assessment of improvement in vertex region vs fronto-temporal region of scalp

	Vertex	Fronto-temporal	P value
No change	0	33.3%	0.15
Mild improvement	**30%**	42.9%	1.00
Moderate improvement	**50%**	23.8%	0.32
Excellent improvement	**20%**	0	0.22

Figure-3: A 26-year-old male with grade III AGA at baseline (A). Moderate improvement seen after four sessions of PRP (B)

DISCUSSION

Platelet-rich plasma (PRP) has recently emerged as a novel therapeutic avenue for androgenic alopecia (AGA), spurring a surge of new research exploring its potential effects on hair. One significant mechanism proposed to underlie PRP's hair growth stimulation is its antiapoptotic properties. Activation of PRP has been suggested to prolong the survival of dermal papilla cells throughout the hair cycle by activating antiapoptotic regulators like the Bcl-2 protein and Akt signaling [8-10]. Additionally, PRP is believed to upregulate FGF-7/β-catenin signaling pathways, promoting hair growth by fostering differentiation of follicular stem cells and extending the anagen phase of the hair cycle. Moreover, PRP has been shown to enhance the formation of the perifollicular vascular plexus by increasing levels of angiogenic factors such as vascular endothelial growth factor (VEGF) and platelet-derived growth factor (PDGF) [11].

In our study, we observed varying degrees of improvement among patients with AGA treated with PRP. Nearly half of the patients exhibited mild improvement, while a smaller proportion experienced moderate improvement, with one patient demonstrating excellent results. Notably, all patients with vertex involvement showed a positive response to PRP treatment, with a greater proportion displaying moderate to excellent improvement compared to those with fronto-temporal involvement. Although the difference in treatment response between these scalp regions was not statistically significant, our findings align with previous researches [12-19].

Assessment of treatment response involved subjective methods, including patient and evaluator self-assessment on a 7-point scale, offering simplicity and convenience for routine clinical practice. However, this approach contrasts with the more objective evaluation methods employed in previous studies, [17-18] which utilized measures such as global photography, dermoscopic images, mean hair count, and anagen-to-telogen ratio. Additionally, variations in PRP administration protocols, centrifugation settings, and outcome measures across studies complicate direct comparisons, underscoring the need for standardized approaches in future research.

CONCLUSION

Platelet-rich plasma (PRP) therapy offers a straightforward and cost-effective approach to treating androgenic alopecia (AGA). Among various types of AGA, Grade III vertex demonstrates the most favorable response to PRP treatment. With high patient satisfaction rates and minimal adverse effects, PRP presents itself as a viable option for individuals who have not responded satisfactorily to minoxidil or finasteride. Additionally, combining PRP with medications may further enhance treatment outcomes.

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