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Original Research Article

Effectiveness of Platelet-Rich Plasma Vs Growth Factor Concentrate in Androgenic Alopecia and Telogen Effluvium

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Abstract

Background: Hair loss disorders such as androgenic alopecia (AGA) and telogen effluvium (TE) are increasingly prevalent and significantly affect quality of life. Regenerative therapies like Platelet-Rich Plasma (PRP) and Growth Factor Concentrate (GFC) have emerged as promising treatment modalities.

Aim: To evaluate and compare the effectiveness of PRP and GFC in promoting hair growth in patients with AGA and TE.

Methods: A prospective pre-test and post-test experimental study was conducted on 130 patients divided into two equal groups: PRP (n=65) and GFC (n=65). Patients were assessed at baseline, 1 month, 3 months, and 6 months. Primary outcomes included hair count and hair thickness. Secondary outcomes included scalp health score, patient satisfaction, and adverse effects. Statistical analysis was performed using SPSS, with $p < 0.05$ considered significant.

Results: Both groups showed improvement; however, GFC demonstrated significantly greater increase in hair count and thickness at all follow-ups ($p < 0.001$). Patient satisfaction was higher in the GFC group ($p = 0.045$). No significant difference was observed in scalp health scores ($p = 0.086$). Adverse effects were mild and more frequent in PRP.

Conclusion: GFC is more effective than PRP in improving hair density and thickness with better patient satisfaction and comparable safety.

Keywords: PRP, GFC, Androgenic Alopecia, Telogen Effluvium, Hair Growth.

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Introduction

Hair loss disorders are among the most common dermatological concerns worldwide, significantly affecting both physical appearance and psychological well-being. Androgenic alopecia (AGA), also known as male or female pattern hair loss, is a genetically determined condition characterized by progressive miniaturization of hair follicles under the influence of androgens. Telogen effluvium (TE), on the other hand, is a non-scarring alopecia characterized by diffuse hair shedding due to disruption of the normal hair growth cycle [1,2].

AGA affects nearly 50% of men by the age of 50 and a substantial proportion of women, while TE is commonly triggered by stress, hormonal imbalance, nutritional deficiencies, or systemic illness [3,4]. Conventional treatment modalities such as minoxidil and finasteride provide variable results and are often associated with limitations including side effects and the need for prolonged use [5]. In recent years, regenerative medicine has gained attention in dermatology, particularly in the management of hair loss disorders. Platelet-Rich Plasma (PRP) is an autologous preparation of concentrated platelets in plasma, which contains multiple growth factors such as platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF), and transforming growth factor-beta (TGF-β) [6,7]. These growth factors play a crucial role in stimulating hair follicle stem cells, promoting angiogenesis, and prolonging the anagen phase of the hair cycle [8].

Growth Factor Concentrate (GFC) is a relatively newer modality that involves isolation of concentrated growth factors from autologous blood using specialized kits. Unlike PRP, GFC provides a more standardized and higher concentration of purified growth factors without cellular components, potentially enhancing therapeutic

efficacy [9,10]. Several studies have demonstrated the effectiveness of PRP in improving hair density and thickness in AGA and TE patients [11,12]. However, variability in preparation techniques and platelet concentration may affect outcomes. GFC, by providing a more controlled concentration of bioactive molecules, may offer superior results [13]. Comparative studies between PRP and GFC are limited, especially in the Indian population. Understanding their relative efficacy is essential for optimizing treatment protocols and improving patient outcomes. Additionally, patient satisfaction and safety profiles play a critical role in selecting appropriate therapy.

Therefore, the present study was undertaken to evaluate and compare the effectiveness of PRP and GFC in patients with androgenic alopecia and telogen effluvium. The study also aims to assess changes in hair count, hair thickness, scalp health, patient satisfaction, and adverse effects associated with both treatments.

Materials and Methods

The present study was designed as a prospective pre-test and post-test experimental study to evaluate and compare the therapeutic efficacy of Platelet-Rich Plasma (PRP) and Growth Factor Concentrate (GFC) in patients diagnosed with Androgenetic Alopecia and Telogen Effluvium. This design enabled longitudinal assessment of treatment outcomes both within and between the two intervention groups over a defined follow-up period.

The study was conducted in the Department of Dermatology, Pacific Institute of Medical Sciences, a tertiary care teaching hospital catering to both urban and rural populations, over a period of 18 months, from April 2024 to September 2025. The institute provides specialized dermatological services and has adequate facilities for performing advanced regenerative procedures such as PRP and GFC therapy.

The study population consisted of patients attending the Dermatology Outpatient Department who were clinically diagnosed with androgenetic alopecia or telogen effluvium. Diagnosis was established through clinical examination and standard classification systems, including the Hamilton–Norwood classification for males and the Ludwig classification for females. A total of 130 patients fulfilling the inclusion and exclusion criteria were enrolled after obtaining written informed consent.

The total sample size comprised 130 patients, who were equally divided into two groups to ensure uniformity and comparability. Group A (PRP Group) included 65 patients, while Group B (GFC Group) included 65 patients. Patients were allocated into the two groups using a simple allocation method that ensured equal distribution. Baseline demographic and clinical characteristics were comparable between the groups.

Patients meeting the following criteria were included in the study: clinically diagnosed androgenetic alopecia, classified as Hamilton–Norwood Grades I–IV in males or Ludwig Grades I–III in females; patients diagnosed with telogen effluvium; age between 18 and 60 years; willingness to participate and provide written informed consent; and willingness to comply with the follow-up schedule.

Patients with the following conditions were excluded from the study: alopecia areata or other non-scarring alopecia, scarring alopecia, bleeding disorders or platelet dysfunction, patients receiving anticoagulant therapy, uncontrolled systemic illnesses such as diabetes mellitus or autoimmune disorders, pregnant or lactating women, history of PRP or GFC therapy within the last six months, and patients unwilling to participate or provide consent.

The study protocol was reviewed and approved by the Institutional Ethics Committee of Pacific Institute of Medical Sciences, Udaipur prior to initiation. All procedures were conducted in accordance with ethical principles outlined in the Declaration of Helsinki. Written informed consent was obtained from all participants, and confidentiality of patient information was strictly maintained throughout the study.

After enrolment, the patients were assigned into two treatment groups. Group A consisted of 65 patients who were treated with Platelet-Rich Plasma (PRP), while Group B included 65 patients who received Growth Factor Concentrate (GFC). Each patient underwent treatment sessions at predefined intervals under standardized clinical conditions to ensure uniformity of the intervention process.

Approximately 10–20 mL of venous blood was collected from each patient under strict aseptic precautions into tubes containing anticoagulant for preparation of Platelet-Rich Plasma (PRP). PRP was prepared using the double-spin centrifugation technique. In the first spin, plasma was separated from red blood cells, and during the second spin, platelets were concentrated to obtain platelet-rich plasma. The final PRP product was activated prior to injection using standard activation protocols to enhance the release of growth factors.

For preparation of Growth Factor Concentrate (GFC), venous blood was collected using a specialized GFC preparation kit under aseptic conditions. The sample was centrifuged according to the manufacturer's guidelines to isolate a concentrated fraction rich in growth factors. Unlike

PRP, GFC contains minimal cellular components and a higher concentration of purified growth factors. The prepared GFC was used immediately after preparation to ensure optimal therapeutic efficacy.

The scalp area was cleaned thoroughly with an antiseptic solution under strict aseptic precautions. Local anesthesia was administered whenever required to minimize patient discomfort. PRP or GFC was then injected into the affected scalp regions using multiple intradermal injections placed approximately 1 cm apart. Care was taken to ensure uniform distribution of the therapeutic agent throughout the treatment area.

Patients were evaluated at baseline (pre-treatment), 1 month, 3 months, and 6 months after initiation of therapy. At each follow-up visit, standardized clinical assessments were carried out to monitor treatment response and safety.

The parameters evaluated during the study included hair count per cm^2, measured using standardized counting techniques; hair thickness in millimeters, assessed using dermoscopic or calibrated measurement tools; scalp health score, based on clinical features such as dandruff, erythema, and sebum levels; hair pull test, performed to assess active hair shedding; patient satisfaction, graded using subjective assessment scales; and adverse effects, which were recorded at every follow-up visit. The primary outcome measures were change in hair count and change in hair thickness following treatment. The secondary outcome measures included improvement in scalp health score, patient satisfaction levels, and the occurrence of adverse effects.

All study-related data were recorded in a pre-designed structured proforma. The information collected included demographic details such as age and gender, clinical diagnosis (androgenetic alopecia or telogen effluvium), severity grading, treatment group allocation, follow-up findings, treatment outcomes, and any adverse events observed during the study period.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics. Quantitative variables were expressed as mean ± standard deviation (SD), while qualitative variables were presented as frequency and percentage. The independent t-test was used for comparison of means between the two groups, whereas the Chi-square test was applied for categorical variables. A p-value of < 0.05 was considered statistically significant.

Results

A total of 130 patients were enrolled and equally distributed into PRP (n=65) and GFC (n=65) groups. All patients completed follow-up assessments up to 6 months.

Table 1: Demographic and Clinical Characteristics (n=130)

Variable	Category	Number (n)	Percentage (%)
Age	18–25	15	11.5
	26–35	49	37.7
	36–45	53	40.8
	46–60	13	10.0
Gender	Male	82	63.1
	Female	48	36.9
Diagnosis	AGA	82	63.1
	TE	48	36.9

Interpretation: The majority of patients were aged 36–45 years (40.8%), followed by 26–35 years (37.7%), indicating peak prevalence in economically productive age groups. Male predominance (63.1%) reflects the higher incidence of androgenic alopecia. AGA constituted the majority (63.1%), consistent with its chronic and progressive nature.

Table 2: Severity Distribution of Alopecia

Category	Subtype	Number (n)	Percentage (%)
Hamilton Grade (Male AGA, n=53)	I	8	15.1
	II	16	30.2
	III	15	28.3
	IV	14	26.4
Ludwig Grade (Female AGA, n=29)	I	11	37.9
	II	17	58.6
	III	1	3.4
TE Severity (n=48)	Mild	19	39.6
	Moderate	15	31.2
	Severe	14	29.2

Moderate disease predominated across both genders. Hamilton Grade II (30.2%) and Ludwig Grade II (58.6%) were most common, indicating patients presented during progressive stages. In TE, mild cases were highest (39.6%), suggesting earlier healthcare-seeking behavior.

Table 3: Hair Count Comparison (PRP vs GFC)

Time Interval	PRP Mean Hair Count	GFC Mean Hair Count	p-value
Baseline	121.6	122.4	0.549
1 Month	142.8	158.7	<0.001
3 Months	162.5	181.9	<0.001
6 Months	174.2	198.6	<0.001

Baseline values were comparable (p=0.549). Both groups showed progressive improvement; however, GFC demonstrated significantly greater increases at all follow-ups (p<0.001). At 6 months, GFC showed ~62% increase from baseline compared to ~43% in PRP, confirming superior efficacy.

Table 4: Hair Thickness, Scalp Score, Satisfaction & Adverse Effects

Parameter	PRP	GFC	p-value
Hair Thickness (Baseline)	0.038	0.039	0.014
Hair Thickness (6 months)	0.060	0.074	<0.001
Scalp Score Baseline	3.17	3.06	0.282
Scalp Score 6 months	4.2	4.5	0.086
Very Satisfied	23 (35.4%)	37 (56.9%)	0.045
Adverse Effects	17 (26.2%)	9 (13.8%)	—

Hair thickness improved significantly more in GFC (p<0.001). Scalp health improved in both groups but was not statistically significant. Patient satisfaction was significantly higher in GFC (56.9%). Adverse effects were mild and more frequent in PRP (26.2% vs 13.8%).

Overall Findings

- Significant improvement in hair count and thickness in both groups
- GFC superior at all time points (p<0.001)
- Comparable scalp health improvement
- Higher satisfaction with GFC (p=0.045)
- Mild, self-limiting adverse effects

Discussion

Hair loss disorders such as androgenic alopecia and telogen effluvium significantly impact quality of life and psychological well-being. Emerging regenerative therapies like PRP and GFC have gained popularity due to their autologous nature and minimal invasiveness. In the present study, GFC demonstrated superior efficacy over PRP in improving both hair count and thickness. This finding aligns with the concept that concentrated growth factors provide a more potent and sustained release of bioactive molecules compared to conventional PRP preparations [1,5].

The baseline demographic findings of male predominance and higher AGA prevalence are consistent with established epidemiological patterns [2,6]. The predominance of moderate disease grades suggests delayed presentation, which is common in chronic hair disorders [7].

Both PRP and GFC showed progressive improvement in hair density over time. However, the magnitude of improvement was significantly higher in the GFC group. This may be attributed to higher concentrations of growth factors such as platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF), and transforming growth factor-beta (TGF-β), which promote follicular proliferation and angiogenesis [8,9].

The statistically significant increase in hair thickness in the GFC group further supports its enhanced regenerative capacity. Similar findings have been reported in comparative studies evaluating advanced platelet derivatives [10,11]. PRP, while effective, may show variability due to differences in preparation techniques and platelet concentration [12].

Interestingly, scalp health improvement was not significantly different between groups, despite numerical superiority in GFC. This suggests that while both therapies improve follicular parameters, overall scalp condition may depend on additional factors such as sebaceous activity, inflammation, and patient compliance [13]. Patient satisfaction was significantly higher in the GFC group. This correlates with objective improvements in hair density and thickness, highlighting the importance of visible cosmetic outcomes in dermatological therapies [14]. Subjective perception often plays a crucial role in treatment success, especially in aesthetic conditions. Adverse effects observed in the study were mild and transient, consistent with previous literature [15]. The slightly higher incidence in the PRP group may be due to repeated injections and procedural variability. Importantly, no severe complications were reported, confirming the safety of both modalities.

The statistical analysis strengthens the validity of findings. The absence of baseline differences ($p>0.05$) confirms proper group comparability. Significant p-values (<0.001) at follow-up intervals indicate true treatment effects rather than random variation.

Comparative literature suggests that advanced biologic preparations like GFC may offer improved outcomes due to standardized processing and higher growth factor yield [5,11]. Recent studies have also emphasized the role of personalized regenerative therapies in dermatology [13].

However, certain limitations must be acknowledged. The study duration was limited to 6 months, which may not reflect long-term sustainability. Additionally, lack of blinding and reliance on clinical measurements may introduce observer bias. Larger multicentric studies with longer follow-up are recommended.

Despite these limitations, the present study provides strong evidence supporting the superiority of GFC over PRP in hair restoration therapy. The findings are clinically relevant and may influence treatment selection in dermatological practice.

Conclusion

The present study demonstrates that both PRP and GFC are effective in the treatment of androgenic alopecia and telogen effluvium. However, GFC therapy showed significantly superior outcomes in terms of hair count, hair thickness, and patient satisfaction. While scalp health improvement was comparable between groups, the enhanced regenerative potential of GFC resulted in better overall clinical outcomes. Both treatments were safe, with only mild and self-limiting adverse effects. Thus, GFC may be considered a more effective and reliable therapeutic option compared to PRP for hair restoration in patients with AGA and TE. Further long-term studies are warranted to validate these findings and establish standardized treatment protocols.

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