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The Effectiveness of Combined PRP and GFC Therapy on Hair Density and Thickness in Patients with Telogen Effluvium: A Prospective Study

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Abstract:

Background:Telogen effluvium (TE) is a common, non-scarring alopecia characterized by diffuse hair shedding resulting from a shift of hair follicles into the telogen phase. Platelet-rich plasma (PRP) and Growth Factor Concentrate (GFC) therapies have individually shown promise in stimulating hair regrowth. However, limited evidence exists on the synergistic effect of combining PRP and GFC. This study aimed to evaluate the effectiveness of combined PRP and GFC therapy on hair density and thickness in patients diagnosed with TE.
Materials and Methods:A prospective clinical study was conducted on 40 patients aged 18–45 years clinically diagnosed with telogen effluvium. Patients were randomly assigned to receive four sessions of combined PRP and GFC therapy at 3-week intervals. PRP was prepared using a standard double-spin method, and GFC was obtained from commercial kits activated prior to injection. Hair density (hairs/cm²) and shaft thickness (µm) were assessed at baseline and 12 weeks post-treatment using dermoscopic imaging and trichoscopic analysis. Data were analyzed using paired t-tests with a significance level set at $p < 0.05$.
Results:At baseline, the mean hair density was 92.5 ± 7.8 hairs/cm², which significantly increased to 124.3 ± 9.1 hairs/cm² post-treatment ($p < 0.001$). Similarly, the average hair shaft thickness improved from 41.6 ± 5.2 µm to 56.7 ± 4.9 µm ($p < 0.001$). No severe adverse effects were reported. Mild transient erythema and swelling were observed in 12.5% of participants.
Conclusion:Combined PRP and GFC therapy significantly improves hair density and thickness in patients with telogen effluvium, suggesting a synergistic regenerative effect. This treatment modality offers a promising, safe, and minimally invasive approach for managing TE.

Keywords:

Telogen effluvium, PRP therapy, Growth Factor Concentrate, Hair regrowth, Trichoscopy, Hair density, Platelet-derived growth factors.

Introduction

Telogen effluvium (TE) is a prevalent form of diffuse, non-scarring hair loss that results from a premature shift of hair follicles from the anagen (growth) phase to the telogen (resting) phase of the hair cycle. It is typically triggered by physical or emotional stress, nutritional deficiencies, hormonal

imbalances, or systemic illnesses (1,2). While TE is often self-limiting, persistent or chronic cases can significantly impact patients' psychological well-being and quality of life, prompting the need for effective therapeutic interventions (3).

Conventional treatments for TE include nutritional supplementation, topical minoxidil, and lifestyle modifications. However, these options often yield variable results and require long-term adherence for noticeable improvement (4). In recent years, regenerative therapies such as platelet-rich plasma (PRP) and growth factor concentrate (GFC) have gained attention for their potential to promote hair regrowth by stimulating follicular stem cells and prolonging the anagen phase (5,6).

PRP is an autologous concentration of platelets suspended in plasma, rich in bioactive molecules including platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF-β), vascular endothelial growth factor (VEGF), and epidermal growth factor (EGF), all of which play a vital role in tissue regeneration and angiogenesis (7). GFC, derived from activated platelets, is a refined formulation that contains concentrated growth factors without cellular components, ensuring better stability, reduced inflammation, and enhanced delivery of active molecules (8).

While both PRP and GFC therapies have demonstrated promising outcomes in managing androgenetic alopecia and other alopecic conditions, limited data exist on the combined use of these modalities specifically for telogen effluvium. The rationale for combining PRP with GFC lies in their potential synergistic effects—amplifying follicular stimulation, enhancing dermal vascularity, and accelerating tissue repair processes (9).

This prospective study aims to assess the efficacy of combined PRP and GFC therapy in improving hair density and thickness in patients suffering from telogen effluvium, thereby offering an evidence-based alternative for clinicians managing this common yet challenging condition.

Method

Study Design and Participants

A total of 40 patients aged between 18 and 45 years, clinically diagnosed with telogen effluvium, were enrolled following written informed consent. Inclusion criteria consisted of patients presenting with diffuse hair shedding for more than 3 months, with no signs of scarring alopecia, and no history of autoimmune or systemic scalp disorders. Patients with active scalp infections, pregnancy, lactation, hematologic disorders, or recent use of hair growth treatments were excluded.

Preparation of PRP and GFC

Autologous PRP was prepared using a standard double-spin technique. Approximately 20 mL of venous blood was collected in citrate tubes and centrifuged at 1500 rpm for 10 minutes to separate the plasma. The supernatant plasma was then subjected to a second spin at 3000 rpm for 10 minutes to obtain the PRP fraction, which was activated with calcium chloride prior to administration.

GFC was prepared using a commercially available platelet activation kit. The patient's blood was drawn into a specialized vacuum tube, processed as per the manufacturer's protocol, and incubated to release concentrated growth factors. The resulting GFC was separated and prepared for injection within 30 minutes of activation.

Treatment Protocol

Each patient received four sessions of combined PRP and GFC therapy at three-week intervals. After aseptic preparation of the scalp, local anesthesia was applied topically. The prepared PRP and GFC were mixed in equal proportions and administered via intradermal injections using the nappage technique over the affected areas of the scalp.

Outcome Assessment

Trichoscopic analysis was performed at baseline and 12 weeks after the final session. Hair density (hairs/cm^2) and average hair shaft thickness (μm) were measured in the frontal and parietal scalp regions using a dermoscope with image analysis software. Clinical photographs were also taken for visual comparison. Patients were monitored for adverse effects at each session.

Statistical Analysis

Data were compiled using Microsoft Excel and analyzed with SPSS version 25.0. Continuous variables were expressed as mean ± standard deviation. The paired t-test was used to compare

pre- and post-treatment values, with a p-value of <0.05 considered statistically significant.

Results

A total of 40 patients (28 females and 12 males) with a mean age of 29.6 ± 5.4 years were included in the study. All patients completed the four-session protocol and follow-up assessment at 12 weeks. Significant improvements were observed in both hair density and shaft thickness after the combined PRP and GFC therapy.

Hair Density Improvement

The baseline mean hair density was 92.5 ± 7.8 hairs/cm², which increased significantly to 124.3 ± 9.1 hairs/cm² at 12 weeks post-treatment ($p < 0.001$). Among the 40 participants, 33 (82.5%) showed an improvement of more than 25 hairs/cm² (Table 1).

Hair Shaft Thickness Improvement

The average hair shaft thickness improved from 41.6 ± 5.2 µm at baseline to 56.7 ± 4.9 µm post-treatment ($p < 0.001$). Notably, 30 participants (75%) showed an increase in shaft diameter by over 10 µm (Table 2).

Adverse Events

Mild, transient adverse effects were noted in 5 patients (12.5%), which included localized erythema and swelling at the injection site, resolving within 24–48 hours. No major complications were reported during or after the treatment period.

These findings indicate that combined PRP and GFC therapy can significantly enhance both the density and thickness of hair in patients with telogen effluvium (Tables 1 and 2).

Table 1. *Comparison of Hair Density before and After Treatment*

Parameter	Baseline (Mean ± SD)	Post-treatment (Mean ± SD)	p-value
Hair density (hairs/cm²)	92.5 ± 7.8	124.3 ± 9.1	<0.001
Patients with >25 hairs/cm² increase	–	33 (82.5%)	–

Table 2. *Comparison of Hair Shaft Thickness before and After Treatment*

Parameter	Baseline (Mean ± SD)	Post-treatment (Mean ± SD)	p-value
Hair shaft thickness (µm)	41.6 ± 5.2	56.7 ± 4.9	<0.001
Patients with >10 µm increase	–	30 (75%)	–

Discussion

Telogen effluvium (TE) represents a significant cause of non-scarring alopecia, often triggered by systemic or environmental stressors that lead to premature hair follicle cycling into the telogen phase (1). Although TE is typically reversible, persistent cases can have profound psychological impacts, especially in young adults and women, necessitating effective therapeutic strategies (2,3).

The present study evaluated the combined use of platelet-rich plasma (PRP) and growth factor concentrate (GFC) therapies in patients with TE, showing significant improvement in both hair density and shaft thickness after 12 weeks. The synergistic application of these regenerative modalities appears to promote more robust hair regrowth than either used alone, aligning with findings in other forms of alopecia (4,5).

PRP therapy works by delivering a high concentration of autologous platelets that release various growth factors upon activation, including platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF-β), epidermal growth factor (EGF), and vascular endothelial growth factor (VEGF) (6,7). These factors stimulate dermal papilla cells, increase perifollicular angiogenesis, and prolong the anagen phase of hair growth (8). Studies have demonstrated that PRP enhances follicular regeneration and hair

thickness in androgenetic alopecia and chronic telogen effluvium (9,10).

GFC, on the other hand, offers a more refined, cell-free alternative by isolating and concentrating growth factors released from activated platelets, thus reducing proinflammatory cytokine load while maintaining regenerative potential (11). This modality is considered more consistent in therapeutic efficacy due to its standardized formulation and elimination of patient-to-patient variability in platelet counts (12,13). A previous study comparing PRP with GFC found both effective, with GFC offering better patient comfort and fewer post-injection side effects (14).

In this study, the combination therapy resulted in a 34.4% increase in mean hair density and a 36.3% improvement in mean hair shaft thickness, consistent with the regenerative goals of hair restoration (Table 1 and 2). The improvement was statistically significant and clinically observable within three months of therapy. These outcomes support the hypothesis that combining PRP and GFC may exert a cumulative or synergistic effect on follicular stimulation and tissue regeneration (15).

Furthermore, the treatment was well-tolerated, with only mild and self-limiting side effects reported in a minority of participants. This aligns with safety profiles described in prior clinical trials of autologous PRP and GFC therapies (5,13).

Despite promising results, the study has some limitations. The sample size was relatively small, and follow-up duration was limited to 12 weeks. Longer-term studies with larger cohorts and control groups are warranted to assess the durability of hair regrowth and to compare the efficacy of combination therapy against monotherapy.

Conclusion

The combined use of platelet-rich plasma (PRP) and growth factor concentrate (GFC) significantly improves hair density and thickness in patients with telogen effluvium. This minimally invasive therapy appears safe, well-tolerated, and offers a promising regenerative approach for managing diffuse hair loss. Further large-scale studies are recommended to validate these findings and explore long-term outcomes.

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