Original Research

SAFETY AND THERAPEUTIC OUTCOMES OF COMBINED PLATELET-RICH PLASMA AND TOPICAL MINOXIDIL THERAPY IN PATIENTS WITH CHRONIC HAIR FALL

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ABSTRACT

Background: Chronic hair fall with non-scarring alopecia is a significant psychological burden, making the response to monotherapy slow and incomplete. Using PRP together with topical minoxidil could be more effective at enhancing hair density as they work in synergy.

Methods: This prospective observation study assessed the safety and efficacy of PRP and topical minoxidil combination therapy in chronic hair fall patients. 72 patients with androgenetic alopecia or chronic telogen effluvium for over six months were injected monthly with a platelet-rich plasma for four months and applied with a topical minoxidil for six months. Clinical assessment, standardised global photography, hair-pull test, trichoscopic evaluation of hair density, mean hair shaft diameter, Dermatology Life Quality Index and adverse events were recorded at baseline, 3 and 6 months.

Results: Mean hair density increased from 91.6 +/- 18.8 hairs/cm2 at baseline to 113.4 +/- 20.7 hairs/cm2 at three months and 129.8 +/- 23.1 hairs/cm2 at six months ($p<0.001$). Hair-pull positivity decreased from 65.3% to 15.3% ($p<0.001$), and mean DLQI improved from 9.2 +/- 3.4 to 4.1 +/- 2.2 ($p<0.001$). Of the patients, 52.8% showed good or excellent improvement globally at 6 months.

Conclusion: The adverse events were mild, and consisted of transient injection-site pain, erythema at the injection site, headache and irritation associated with minoxidil. PRP + minoxidil therapy was found to be safe and effective for chronic hair fall with marked clinical and trichoscopic improvement.

Keywords: Platelet-Rich Plasma, Minoxidil, Chronic Hair Fall, Androgenetic Alopecia, Telogen Effluvium, Trichoscopy, Hair Density.

INTRODUCTION

Hair loss is a frequent dermatological problem that can be caused by androgenetic alopecia, chronic telogen effluvium, nutritional or endocrine disorders, or stress and/or combination of all these factors. Non-scarring alopecia can have a psychological impact on body image, self-esteem and quality of life and patients may seek long-term medical and procedural treatment [1]. The problem with the therapy is that visible improvement is slow, and treatment is inconsistent and many patients stop before measurable regrowth has taken place [2].

One of the most effective and proven treatments for patterned hair loss is topical minoxidil. It extends anagen, enlarges follicles, enhances perifollicular blood flow and could enhance growth factor signaling [3].

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Response is however variable, and there are other local side effects like irritation, hypertrichosis and poor cosmetic acceptability that decrease adherence [4]. In patients with high shedding activity or more advanced miniaturization, minoxidil may not be enough.

Platelet rich plasma is an autologous concentrate, rich in platelets and growth factors such as platelet-derived growth factor, vascular endothelial growth factor, transforming growth factor and insulin-like growth factor. These are mediators that can activate dermal papilla activity, angiogenesis, and growth of the hair follicles [5]. Based on clinical trials and meta-analysis, PRP has shown potential in enhancing hair density and thickness within the context of androgenetic alopecia, with the conditions for its injection and maintenance following varying protocols, such as platelet count, activation technique, and treatment interval [6,7].

The use of combination therapy is appealing, as PRP can offer procedural stimulation and growth factor delivery, while minoxidil can offer an anagen support continuously. There have been some randomized studies showing that PRP plus

minoxidil is more effective than either agent alone in some patients, but the data is not consistent, and safety data for PRP injections is often inconclusive [8,9]. In the present study, objective evaluation of safety, clinical outcome and trichoscopic findings of combined PRP and topical minoxidil therapy in chronic hair fall patients was conducted in a tertiary dermatology center.

MATERIALS AND METHODS

The study was conducted in the dermatology outpatient department as a prospective, observational study. These included patients aged 18-55 years with chronic hair fall (more than six months) with a confirmed diagnosis of androgenetic alopecia, female pattern hair loss, chronic telogen effluvium or mixed non-scarring alopecia. Exclusion criteria were scarring alopecia, alopecia areata, active scalp infection, platelet count <150000/microliter, anemia with hemoglobin <10 g/dl, uncontrolled thyroid disease, pregnancy, lactation, anticoagulant therapy, keloidal tendency, malignancy and prior PRP within six months.

For baseline evaluation, demographic data, duration of hair fall, family history, precipitating factors, hair pull test, Hamilton-Norwood or Sinclair classification, dermoscopy/trichoscopy, complete blood count, ferritin and thyroid profile were obtained, as indicated. All photographs were taken under standard conditions of distance, lighting and scalp partitioning throughout the world. Trichoscopy was performed to measure hair density and mean hair shaft diameter in a marked area on the most affected scalp area.

The double spin procedure was used to prepare the autologous PRP. Venous blood, about 18 ml was drawn in acid citrate dextrose tubes. Platelet-rich plasma was collected following the centrifugation using soft spin and hard spin and then applied without exogenous activation. Aseptic technique and topical anesthesia were used to inject PRP intradermally with nappage technique at 1 cm intervals over affected scalp areas. Patients were treated with four sessions per month. 5% solution or foam of topical minoxidil was prescribed 1x daily to men and 2% or 5% once daily to women, depending on tolerability and clinician's opinion.

One month, three month and six month follow up was conducted with patients. The main outcome was the hair density change at 6 months by trichoscopy. Secondary outcomes were hair-pull test, mean hair shaft diameter, global photographic score, patient satisfaction, Dermatology Life Quality Index and adverse events. The responses were classified into poor (<10% increase in hair density), moderate (10-20%), good (21-35%) or excellent (>35%). Adverse events were recorded at each visit and included injection pain, erythema, edema, headache, infection, vasovagal symptoms, scalp irritation, hypertrichosis and treatment discontinuation.

All the data were analyzed by SPSS version 26. Continuous variables were presented as mean and standard deviation (SD), and categorical variables as number and percentage. Within patient comparisons were made at baseline, 3 months and 6 months using repeated measures ANOVA or Friedman test. Subgroup analysis was performed with chronic telogen effluvium or mixed alopecia (MTE/MxA) compared to androgenetic alopecia. A p-value of < 0.05 was considered statistically significant.

RESULTS

Seventy-two patients completed six-month follow-up. The mean age was 31.8 +/- 8.4 years, and 40 patients (55.6%) were female. Androgenetic or female pattern hair loss was present in 50 patients, chronic telogen effluvium in 14 and mixed non-scarring alopecia in 8. The mean duration of hair fall was 18.6 +/- 9.7 months.

Trichoscopic hair density improved progressively from baseline to three and six months. Mean hair density increased from 91.6 +/- 18.8 hairs/cm2 at baseline to 113.4 +/- 20.7 hairs/cm2 at three months and 129.8 +/- 23.1 hairs/cm2 at six months ($p<0.001$). Mean hair shaft diameter increased from 48.7 +/- 8.9 micrometers to 59.4 +/- 10.2 micrometers ($p<0.001$). Hair-pull test positivity declined significantly from 65.3% at baseline to 15.3% at six months.

At six months, 14 patients (19.4%) had excellent improvement, 24 (33.3%) had good improvement, 23 (31.9%) had moderate improvement and 11 (15.3%) had poor improvement. Response was better among patients with shorter disease duration and early-grade patterned hair loss. Adverse events were mild and self-limited. No scalp abscess, scarring, platelet-related complication or serious systemic event occurred.

Table 1. Baseline demographic and clinical characteristics

Variable	Overall cohort (n=72)
Age (years)	31.8 +/- 8.4
Male/Female	32/40
Duration of hair fall (months)	18.6 +/- 9.7
Androgenetic/female pattern hair loss	50 (69.4%)
Chronic telogen effluvium	14 (19.4%)
Mixed non-scarring alopecia	8 (11.1%)

Positive family history	31 (43.1%)
Baseline positive hair-pull test	47 (65.3%)
Mean baseline DLQI	9.2 +/- 3.4

Values are mean +/- SD or number (%). DLQI = Dermatology Life Quality Index.

Table 2. Clinical and trichoscopic outcomes after combined therapy

Outcome	Baseline	3 months	6 months	p-value
Hair density (hairs/cm2)	91.6 +/- 18.8	113.4 +/- 20.7	129.8 +/- 23.1	<0.001
Mean hair shaft diameter (micrometers)	48.7 +/- 8.9	54.6 +/- 9.3	59.4 +/- 10.2	<0.001
Positive hair-pull test	47 (65.3%)	25 (34.7%)	11 (15.3%)	<0.001
DLQI score	9.2 +/- 3.4	6.1 +/- 2.8	4.1 +/- 2.2	<0.001
Patient satisfaction score	4.2 +/- 1.5	6.8 +/- 1.4	8.1 +/- 1.2	<0.001

Patient satisfaction was assessed on a 0-10 numeric scale.

Table 3. Response categories and adverse events at 6 months

Parameter	Number (%)
Excellent response (>35% density increase)	14 (19.4%)
Good response (21-35% density increase)	24 (33.3%)
Moderate response (10-20% density increase)	23 (31.9%)
Poor response (<10% density increase)	11 (15.3%)
Transient injection-site pain	39 (54.2%)
Scalp erythema/edema	16 (22.2%)
Headache after PRP	7 (9.7%)
Minoxidil-related irritation/scaling	9 (12.5%)
Unwanted facial hypertrichosis	3 (4.2%)
Treatment discontinuation due to adverse event	2 (2.8%)

All adverse events were mild; no serious procedure-related event was recorded.

DISCUSSION

In the present study, it has been shown that PRP in combination with topical minoxidil therapy is clinically and trichoscopically effective in chronic hair fall after six months. Hair density, hair shaft diameter, hair-pull test positivity and satisfaction and quality of life improved over follow-up. The improvement was largest from baseline to 3 months, with further improvement seen at 6 months, indicating that prolonged topical therapy following the first PRP treatments may be beneficial.

There is a strong biological justification for combination therapy. Minoxidil works by opening potassium channels, having a vascular effect, and extending anagen, while PRP provides growth factors from the patient's own blood that might stimulate signaling from the dermal papillae and perifollicular angiogenesis [10,11]. In some patients, androgenetic alopecia is characterized by progressive miniaturization and follicular cycling abnormalities; hence, an androgenetic alopecia combined with both pharmacological and regenerative stimulation might be more effective than either treatment alone [12].

Our results support the randomized and comparative studies that proved PRP and minoxidil treatments to be effective in enhancing patient satisfaction and hair density in male and female pattern hair loss [8,9,13]. The result must be taken with a pinch of salt though, as hair fall is a rather heterogeneous phenomenon. Early patterned hair loss and shorter disease duration seemed to fare better, while long-standing miniaturization and shedding with systemic triggers demonstrated less density gains. Treatment of anemia, thyroid problems, nutritional deficiency and stressors is still necessary.

Safety was acceptable. Injection-site pain and transient erythema was common but did not last. A small minority developed irritation due to the use of minoxidil; this type of irritation was controlled by changing the dose or using the foam formulation or stopping minoxidil temporarily. None of the serious

adverse events, infectious or scarring or systemic have been observed. These results are consistent with the reviews which indicate that when used with sterile technique and patient selection, PRP is a fairly safe procedure [14].

Practical issues are also discussed. However, there is no uniformity with respect to PRP protocols, and results can be impacted by the centrifugation system, platelet concentration, activation technique, treatment volume and interval. Likewise, the concentration of minoxidil and compliance affect response. Although standardized photography and trichoscopy are helpful to achieve some objectivity, they do not completely reflect the patient's perception of shedding and cosmetic satisfaction [15].

Limitations are the single arm observational design, absence of minoxidil only comparator, small number of patients and 6 month follow up. The platelet concentration of the last PRP product was not measured in individual patients. Randomized trials with standardized preparation of PRP, longer maintenance follow up and patient reported outcome measures are recommended to compare minoxidil alone with PRP alone and PRP and minoxidil combination.

CONCLUSION

The treatment using a combination of PRP and topical minoxidil was found to be safe and effective, and was associated with a reduction in hair fall, increased density and shaft diameter, and improved patient satisfaction and quality of life in patients with chronic non-scarring hair fall. It seems to be most useful in early patterned hair loss and some chronic exfoliating disorders, and controlled trials with standardized protocols are required to validate the additive effect.

REFERENCES

1. Rogers NE, Avram MR. Medical treatments for male and female pattern hair loss. J Am Acad Dermatol. 2008;59(4):547-566. doi:10.1016/j.jaad.2008.07.001. PMID: 18793935.
2. Messenger AG, Rundegren J. Minoxidil: mechanisms of action on hair growth. Br J Dermatol. 2004;150(2):186-194. doi:10.1111/j.1365-2133.2004.05785.x. PMID: 14996087.
3. Gkini MA, Kouskoukis AE, Tripsianis G, Rigopoulos D, Kouskoukis K. Study of platelet-rich plasma injections in the treatment of androgenetic alopecia. J Cutan Aesthet Surg. 2014;7(4):213-219. doi:10.4103/0974-2077.150743. PMID: 25722600.
4. Gentile P, Garcovich S, Bielli A, Scioli MG, Orlandi A, Cervelli V. The effect of platelet-rich plasma in hair regrowth: a randomized placebo-controlled trial. Stem Cells Transl Med. 2015;4(11):1317-1323. doi:10.5966/sctm.2015-0107. PMID: 26400925.
5. Alves R, Grimalt R. Randomized placebo-controlled, double-blind, half-head study to assess platelet-rich plasma on androgenetic alopecia. Dermatol Surg. 2016;42(4):491-497. doi:10.1097/DSS.0000000000000665. PMID: 27035501.
6. Gupta AK, Carviel JL. Meta-analysis of efficacy of platelet-rich plasma therapy for androgenetic alopecia. J Dermatolog Treat. 2017;28(1):55-58. doi:10.1080/09546634.2016.1227411. PMID: 27562815.
7. Cervantes J, Perper M, Wong LL, Eber AE, Fricke AC, Wikramanayake TC, et al. Effectiveness of platelet-rich plasma for androgenetic alopecia: a review. J Cutan Aesthet Surg. 2018;11(4):193-203. doi:10.4103/JCAS.JCAS_6_18. PMID: 30886475.
8. Singh SK, Kumar V, Rai T. Comparison of efficacy of platelet-rich plasma therapy with or without topical 5% minoxidil in male-type baldness: a randomized, double-blind placebo control trial. Indian J Dermatol Venereol Leprol. 2020;86(2):150-157. doi:10.4103/ijdvl.IJDVL_589_18. PMID: 31823902.
9. Pakhomova EE, Smirnova IO. Comparative evaluation of the clinical efficacy of PRP-therapy, minoxidil, and their combination in men with androgenetic alopecia. Int J Mol Sci. 2020;21(18):6516. doi:10.3390/ijms21186516. PMID: 32899959.
10. Gentile P, Garcovich S. Systematic review of platelet-rich plasma use in androgenetic alopecia compared with minoxidil, finasteride and adult stem cell-based therapy. Int J Mol Sci. 2020;21(8):2702. doi:10.3390/ijms21082702. PMID: 32295024.
11. Agarwal A, Godse K, Patil S, Nadkarni N. Comparative efficacy of topical minoxidil alone against combination of topical minoxidil and platelet rich plasma in women with female pattern hair loss. Indian Dermatol Online J. 2023;14(3):342-347. doi:10.4103/idoj.idoj_600_22. PMID: 37151237.
12. Elena EP, Igor OS. Combination therapy with platelet-rich plasma and minoxidil leads

to better clinical results than monotherapy in men with androgenetic alopecia. Int J Trichology. 2022;14(1):10-16. doi:10.4103/ijt.ijt_59_21. PMID: 35300100.

13. Yao J, Ma W, Chen H, Zhang J. The additive value of platelet-rich plasma to topical minoxidil in the treatment of androgenetic alopecia: a systematic review and meta-analysis. PLoS One. 2024;19(8):e0308986. doi:10.1371/journal.pone.0308986.
14. Xiao C, Wang T, Yang J. Meta-analysis of efficacy of platelet-rich plasma combined with minoxidil in androgenetic alopecia. Aesthetic Plast Surg. 2024. PMID: 38789807.
15. Gupta AK, Venkataraman M, Talukder M. Minoxidil: a comprehensive review. J Dermatolog Treat. 2022;33(4):1896-1906. doi:10.1080/09546634.2021.1945527. PMID: 34137642.

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