

## NEWS, VIEWS, & REVIEWS

# Platelet-Rich Plasma Across the Spectrum of Alopecias: Where Are We Now?

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### INTRODUCTION

Alopecia is characterized by the aberrant absence or loss of hair. The condition is intricately linked to the complex physiology of the hair follicle (HF), where numerous stem cell populations reside and participate in cycles of regeneration.<sup>1</sup> In non-cicatricial alopecia (NCA), the HF stem cells are preserved and there is potential for regrowth whereas they are irreversibly destroyed in cicatricial alopecia (CA).<sup>2</sup> Leveraging the HF's regenerative capacity to stimulate hair growth holds promising therapeutic potential.

In recent years, platelet-rich plasma (PRP) has garnered attention for its role in hair restoration (HR). PRP is an autologous preparation containing concentrated platelets comprising over 20 growth factors (GFs) and cytokines.<sup>2</sup> Platelet GFs act on HF stem cells to stimulate new follicles, prolong the survival of dermal papilla cells, and promote vascularization.<sup>3</sup> The efficacy of PRP has been evaluated across various forms of alopecia, presenting an innovative therapy for patients experiencing limited improvement with conventional hair-loss treatments.

### Non-cicatricial Alopecia

#### *Androgenic Alopecia*

Androgenic alopecia (AGA) is a form of NCA, characterized by a progressively decreased ratio of terminal hairs to vellus hairs. The literature supporting the efficacy of PRP in HR is most established for this form of hair loss (Table 1),<sup>4-7</sup> although the methodology of studies varies widely. In a recent randomized control trial (RCT) involving 72 participants with AGA, PRP treatment demonstrated a 91.7% reduction in hair pull rates after 12 weeks, significantly outperforming topical minoxidil, which achieved a 69.4% reduction.<sup>6</sup> In an 80-patient randomized, double-blinded placebo-controlled trial, concurrent treatment with PRP and topical minoxidil yielded the highest improvement in hair density and patient satisfaction compared to each treatment in isolation, though PRP monotherapy demonstrated superior efficacy when compared to minoxidil monotherapy.<sup>7</sup> A meta-analysis assessing 11 RCTs evaluating the use of PRP for treatment of AGA reported a significantly increased number of hair follicles, hair thickness, and hair density compared to placebo.<sup>8</sup> Similar results have been reported in a meta-analysis evaluating activated-PRP.<sup>9</sup> There is less rigorous data supporting

the use of PRP in pediatric AGA patients, though a case series involving 4 pediatric patients treated with PRP found significant improvement of alopecia stabilization and regrowth with the use of global photographic assessments.<sup>10</sup>

#### *Alopecia Areata*

Alopecia areata (AA) is the most common type of inflammatory hair loss, characterized by an unpredictable course of relapse and remission, lacking curative or preventative treatments. In a clinical trial randomizing 90 AA patients to 3-month treatment with topical minoxidil 5% twice daily, monthly PRP injections, or placebo, PRP resulted in earlier hair regrowth and reduction in short vellus and dystrophic hair compared to the minoxidil and control groups ( $P < 0.05$ ).<sup>11</sup> A randomized, double-blind, placebo and active-controlled parallel group study compared the efficacy of 3 intralesional injections of aPRP, triamcinolone acetonide, and placebo in 45 AA patients.<sup>12</sup> PRP significantly increased hair regrowth and decreased hair dystrophy and associated burning/itching sensations when compared with triamcinolone and placebo. 60% of patients treated with PRP achieved complete remission 9 months after the final treatment cycle. The Ki-67 level, a marker for cell proliferation, was significantly higher with PRP treatment.<sup>12</sup> Altogether, this data suggests that PRP may be superior to traditional alopecia treatments, particularly given the evidence of remission.

### Cicatricial Alopecia

Data regarding the efficacy of PRP for the treatment of CA is largely anecdotal. A systematic review assessing 19 patients with CA reported that PRP was efficacious at alleviating disease progression in 100% of studies, though only case reports and small case series were evaluated.<sup>2</sup> After three PRP sessions, a patient with central centrifugal CA and concomitant AGA achieved a normal temporal hairline follicular density and over 50% increased overall hair density.<sup>13</sup> Another case report demonstrated stabilization of hair loss in a patient with FFA after 5 sessions of PRP in conjunction with standard therapies.<sup>14</sup> PRP has also demonstrated efficacy in a handful of lichen planopilaris cases following 3-4 sessions,<sup>13,15,16</sup> with one study noting complete regression of itching<sup>15</sup> and another reporting no improvement in eyebrow hair density.<sup>16</sup> The cumulative data supporting the use of PRP over standard treatment for CA is limited.

**Table 1.** Summary of Evidence for PRP in the Treatment of Alopecias

Citation	Alopecia Type	Study Type	Objectives	Design	Outcomes	Adverse Events	Conclusions	Level of Evidence <sup>19</sup>
Wei <sup>4</sup> 2023	AGA, 30 males	Randomized double-blind controlled study	Evaluate the efficacy and safety of PRP prepared by automatic blood cell separator combined with topical minoxidil therapy.	Randomized patients to PRP and 5% topical minoxidil (group 1) or PRP and topical placebo (group 2)	Significant increase in HD and quantity after PRP ( $P<0.05$ ). Difference between group 1 and 2 was not significant ( $P>0.05$ ), higher patient satisfaction in group 1.	None reported	PRP combined with topical 5% minoxidil is clinically superior to PRP monotherapy and associated with higher patient satisfaction	2
Balasundaram <sup>5</sup> 2023	AGA, 64 Males	Open-label RCT	Evaluate the efficacy and safety of PRP against topical minoxidil.	Randomized patients to 5% topical minoxidil for 6 months (group 1) or monthly PRP injections for 3 months (group 2)	56% response in minoxidil group and 38% response in PRP group ( $P=0.124$ )	AE in 37% of minoxidil group and 53% of PRP group	PRP is effective but not better than minoxidil and is associated with more AEs	2
Shah <sup>6</sup> 2023	AGA, 73 Pakistani patients	RCT	Compare the efficacy of PRP to topical minoxidil.	Hair-pull test	Negative hair-pull rate was significantly greater in PRP group (97.1%) than minoxidil group (69.4%)	Unable to assess	PRP has higher efficacy compared to topical minoxidil	2
Singh <sup>7</sup> 2020	AGA, 80 Indian Males	Double-blinded placebo control trial	Compare the efficacy of PRP to minoxidil and placebo.	Randomized patients to minoxidil, PRP plus minoxidil, placebo, or PRP treatment	Minoxidil plus PRP group demonstrated maximum increase in HD and patient satisfaction	No major AE with PRP	Treatment with PRP and topical minoxidil is more effective than PRP or topical minoxidil alone.	2
Papakonstantinou <sup>8</sup> 2023	AGA	Systematic review and meta-analysis	Assess the clinical efficacy and safety of PRP treatments.	11 RCTs, 8 included in meta-analysis.	Pooled analysis found increase in number of hairs and HD ( $P=0.005$ ); increases in hair thickness and terminal hair count were not significant ( $P=0.21$ , $P=0.09$ )	Mild localized pain, scalp sensitivity, dryness, itching, headache, lightheadedness, post-injection swelling and bleeding	PRP improves the number of hair and HD in AGA, and there is evidence to support its safety.	1
Morkuzu <sup>9</sup> 2023	AGA, AA	Systematic review and meta-analysis	Assess the clinical efficacy and safety of aPRP	29 articles analyzing a total of 864 patients 25 studies assessed use of aPRP for AGA, 4 assessed use of aPRP in AA 21 studies included in various meta-analyses.	Pooled analyses found greater increase in HD ( $P<0.0001$ ) and terminal HD and hair counts ( $P=0.04$ ) with aPRP compared to controls 2 studies found no significant improvements in AGA or AA	None reported	aPRP improves HD, hair count, and terminal hair number in AGA and AA, and there is evidence to support its safety	3
Tawfik <sup>10</sup> 2023	AGA, 4 pediatric patients	Retrospective case series	Clinical review of efficacy and safety of PRP	Variable durations of treatment, observational assessments	Alopecia stabilization and regrowth observed in all 4 cases	Injection site discomfort	PRP injections improve pediatric AGA and there is evidence to support its safety	6
El Taieb <sup>11</sup> 2017	AA	RCT, 90 patients (ages 10-40)	Compare efficacy and safety of PRP to topical minoxidil 5% and placebo	Clinical and trichoscopic evaluation at baseline and every month for 3 months following monthly PRP injections (group 1), topical minoxidil 5% applied twice daily (group 2), or topical panthenol cream applied twice daily (placebo)	PRP and minoxidil 5% both increased growing hair, decreased yellow dots, and decreased short vellus hairs and dystrophic hairs compared to placebo ( $P<0.05$ ); PRP led to an earlier response in hair changes compared to minoxidil 5%	None reported	PRP is more effective than topical minoxidil 5% and control for the treatment of AGA.	2

**Table 1.** Summary of Evidence for PRP in the Treatment of Alopecias (Continued)

Citation	Alopecia Type	Study Type	Objectives	Design	Outcomes	Adverse Events	Conclusions	Level of Evidence <sup>19</sup>
Trink <sup>12</sup> 2013	AA. 20 male and 24 female patients	Randomized, double-blind, placebo- and active-controlled, half-head, parallel group study	Compare efficacy and safety of aPRP to TAC and placebo.	Half-head intralesional injection of aPRP, TAC, or placebo; measured SALT score, subjective scalp symptoms, and dermoscopic evaluation; participants followed for 1 year	PRP significantly increased hair regrowth compared to TAC; PRP had increased SALT score ( $P<0.001$ ) and increased Ki67 ( $P<0.05$ ) in AA patches compared to TAC; 60% of PRP subjects achieved complete remission.	None reported	PRP injections are more effective than TAC or control for the treatment of AA, and there is evidence to support its safety.	2
Tejapira <sup>2</sup> 2022	PCA, AA	Systematic review	Assess PRP's effect in treating AA and PCAs	621 patients with AA and 19 patients with PCA across 32 studies	PRP was superior in 5 studies and comparable to ILCs in 6 for AA  PRP alleviated disease progression in 9/9 PCA studies	Tolerable pain, scalp discomfort, burning, transient erythema	Recommendations could not be ascertained due to a lack of high-quality evidence	3
Dina <sup>13</sup> 2019	PCA	Case report	Describe efficacy and safety of PRP injections for 2 cases (CCCA and LPP)	3 monthly PRP injections to affected areas	Improvement of HD, decreased perifollicular erythema and scaling	None reported	PRP was associated with global improvement of HD in both patients	6
Özcan <sup>14</sup> 2019	FFA	Case report	Describe use of PRP in a case of FFA refractory to topical and intralesional steroid therapy, hydroxychloroquine, and topical minoxidil	5 monthly PRP injections, observational assessment	Perifollicular erythema, scaling and lichenoid papules on frontotemporal hairline improved, remission after 5 months	None reported	PRP may be effective for FFA recalcitrant to conventional therapies	6
Jha <sup>15</sup> 2018	LPP	Case report	Describe the use of PRP as adjunctive therapy to topical minoxidil	4 PRP sessions, 3 weeks apart with topical minoxidil 2% applied daily	Increased hair thickening	Not reported	PRP injections may be an adjunctive treatment to topical minoxidil for improving hair thickness	6
Bolanča <sup>16</sup> 2016	LPP	Case report	Describe the use of PRP in a case of LPP refractory to topical and intralesional steroid therapy	3 monthly sessions of PRP	Complete regression of hair shedding and scalp itching, resolution of perifollicular erythema and scaling	None reported	PRP is a potentially beneficial treatment option for LPP refractory to standard steroid treatment	6
Uebel <sup>17</sup> 2006	AGA, 20 males	Experimental trial, split head	Compare implantation outcomes of FU's embedded with PRP to non-embedded FU's	Surgical insertion of FUs embedded with PRP on half of head and insertion of non-embedded FUs on other half of head; analysis after 7 months	Mean FU density of PRP group was 15.1% higher with PRP embedding ( $P<0.001$ )	None reported	Embedding FU with PRP improves outcomes in hair transplant surgery	3
Panthania <sup>18</sup> 2023	AGA, 20 males	RCT	Assess efficacy and safety of PRP as an intraoperative holding solution during hair restoration surgery	Surgical implantation of FUs held in PRP (treatment) versus chilled ringers lactate solutions (control)	Increased mean density of implanted FUs at 6 months compared to control group ( $P<0.05$ )	1 case of post-operative furunculosis in PRP group; 2 and 3 cases of sterile folliculitis in PRP and control groups, respectively	The use of an intraoperative PRP holding solution during HR surgery increases mean FU density	2

aPRP=activated PRP; RCT= randomized controlled trial; AE= adverse effect; HD=hair density; AA=alopecia areata; AGA= androgenetic alopecia; TAC= triamcinolone acetonide; ILC=intralesional corticosteroids; PCA=primary cicatricial alopecia; CCCA= central centrifugal cicatricial alopecia; LPP= lichen planopilaris; FFA=frontal fibrosing alopecia; FU= follicular unit; SALT= severity of alopecia tool

### Hair Restoration Surgery

PRP may be a beneficial adjuvant to HR surgery for AGA. A clinical trial demonstrated that implantation of follicular grafts embedded with plasma growth factors in 20 males with AGA substantially increased follicular unit yield ( $P<0.001$ ), resulting in a 15.1% increase in follicular density compared to implantation without plasma GFs.<sup>17</sup> An RCT demonstrated that intraoperative PRP as a holding solution for harvested follicular grafts significantly improved the mean density of the implanted grafts at 6 months compared to the control solution ( $P<0.05$ ).<sup>18</sup>

### Conclusion

PRP is a promising regenerative therapy for NCA, demonstrating superior efficacy to traditional treatment modalities in multiple studies. However, routine implementation is limited by steep out-of-pocket costs, lack of a standardized protocol for the intervention, and variable efficacy amongst patients. Its use in CA remains limited and requires larger, randomized studies to establish efficacy.

### Disclosure

The authors declare no conflicts of interest.

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