

# Androgenetic Alopecia Treatment with PRP

This article reviews the efficacy of platelet-rich plasma with microneedling in androgenetic alopecia.

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Platelet-rich plasma (PRP) is an emerging modality of treatment with remarkable effects without any adverse effects. PRP is an autologous concentration of platelets in a fraction of plasma. Platelets are the source for growth factors and this is the theoretical basis for its use in alopecia as well as other dermatologic conditions.

Androgenetic alopecia (AGA) is a hereditary androgen-dependent disorder of hair that is common among both men and women. Besides being an aesthetic concern for both the patient and the physician, AGA is a common cause of psychosocial stress among both sexes. The treatment modalities are limited to topical minoxidil and oral/topical finasteride. This article discusses findings from our study and in the literature on the efficacy of PRP along with microneedling in AGA patients.

**MATERIAL AND METHODS**

The study included 60 participants (49 men and 11 woman with AGA aged 25 to 45 years, with mean age of 35 years) who did not respond to topical minoxidil and oral finasteride. The study was conducted from August 2015 to October 2016. The scalp was examined to exclude any inflammation, erythema, or scarring prior to the procedure. At each session informed consent and photographs were taken to evaluate overall hair growth, hair volume, and fullness from the front, vertex, lateral, and back view. Exclusion criteria included patients who have history of malignancies, platelets disorders, uncontrolled diabetes mellitus, anemia or bleeding disorders, immunocompromised patients, keloidal tendency, women who are pregnant or breastfeeding, and patients with unrealistic expectations.

Blood (10 mL) was collected from the median cubital vein into tubes containing sodium citrate under aseptic condition. The collected blood sample was centrifuged by double spin method. The first centrifugation called “light spin” was done at 2000 rotations/min (rpm) for 15 minutes (Figure 1). This step separates the blood into 3 layers: lowermost red blood cell layer, topmost platelet-poor plasma (PPP), and an intermediate PRP layer called the “buffy coat.” Buffy coat with PPP is collected



Figure 1. The collected blood sample was centrifuged by double spin method. The first centrifugation called “light spin” was done at 2000 rotations/min (rpm) for 15 minutes.

Table. SUBJECTIVE/PATIENT SATISFACTION SCORE AND OBJECTIVE ASSESSMENT SCORE	
Percent of Improvement	Scoring
<20%	Poor
20%-40%	Fair
40%-60%	Good
60%-80%	Very good
>80%	Excellent

with a pipette into another plain test tube. This tube is again centrifuged at 4000 rpm for 10 minutes, referred to as “heavy spin.” This allows the PRP/buffy coat to form at the bottom of the tube. The upper layer containing PPP is discarded and the lower layer of PRP is collected in another clean tube. The PRP is loaded in 1-mL insulin syringes containing calcium chloride (9 parts PRP and 1 part calcium chloride) just prior to the treatment. Calcium chloride helps in activation of platelets to release growth factors.

The area of the scalp to be treated was cleansed with betadine solution. Microneedling was performed with a motorized derma stamp with 1.5-mm size needles. Pinpoint bleeding was the

endpoint following which PRP was applied topically. Participants were asked to return to home/work same day and advised not to wash the scalp that day. Topical minoxidil was applied from same day until the next session. Sessions were repeated at 6-week intervals and total of 3 to 6 sessions were completed.

**OBSERVATIONS AND RESULTS**

Based on visual analog global scale, objective and subjective scorings were performed as shown in the Table. Objective assessment was conducted by comparing global photographs taken at the beginning of the treatment and 4 weeks after the last session. Patients satisfaction scores were based on hair loss reduction and overall visual improvement in hair



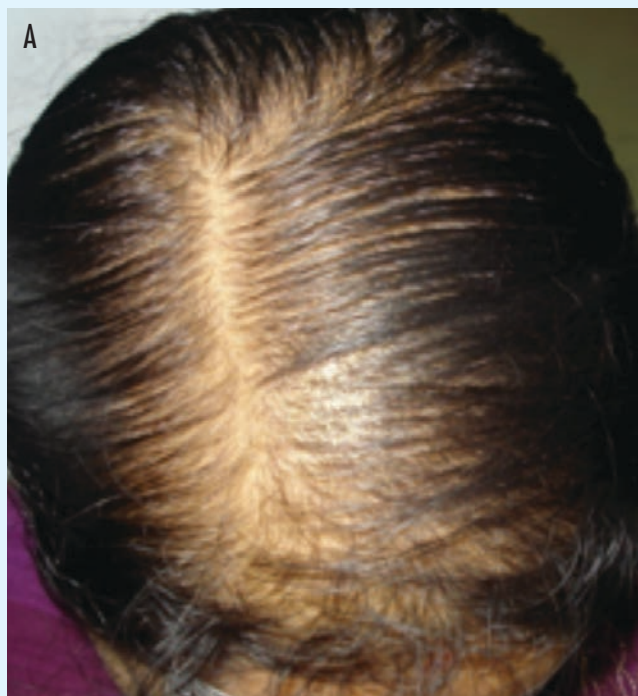


Figure 2A. A 40-year-old woman before treatment.

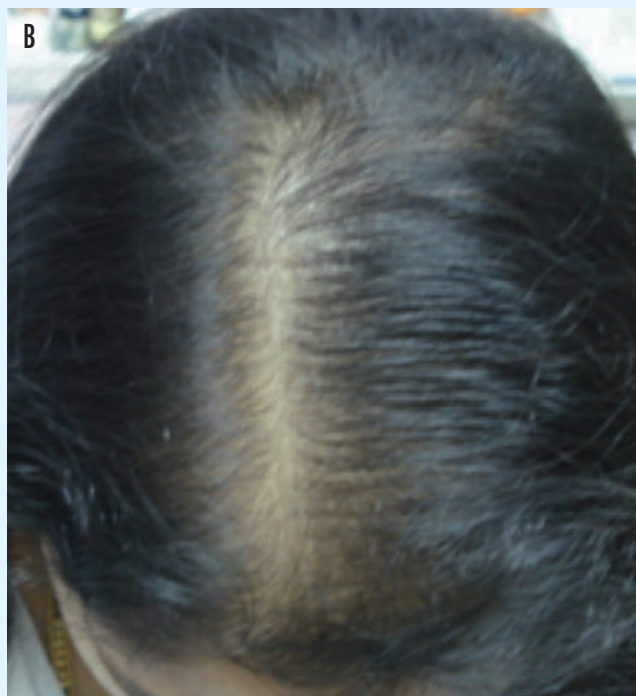


Figure 2B. The same patient after 4 sessions.

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thickness/quality on a scale ranging from 0 to 100% (**Table**). Three participants complained of mild headache after the procedure for 1 day. Headaches subsided with paracetamol 500 mg. No other side effects were experienced by the patients.

According to subjective scores, 22 patients (36%) had very good results, 21 (35%) had good, 9 (15%) had fair, and 8 (13%) did not have any response. Objective assessment showed 22 patients (36%) had very good results, 21 (35%) had good, 13 (22%) had fair, and 4 (7%) did not have any response. Three to 4 sessions were required to achieve good results (**Figures 2A and B**). While 4 patients had very good results in 3 to 4 sessions, 3 other patients had poor response after more than 5 sessions. Follow up after 6 months showed persistent results in all except 3 male patients who resumed hair loss after 3 months.

## DISCUSSION

PRP is an autologous concentration of platelets in a volume of plasma prepared from patient's own blood. The desired platelet concentration is 4 to 5 times above the baseline platelet count which is 200,000 cells/uL. Earlier PRP was used extensively in dentistry, orthopedic, and plastic surgery to prevent infection and enhance wound healing. Recently, interest in PRP in dermatologic and aesthetic indications has emerged.

The hair follicle has a complex biologic structure and growth of the hair process is regulated by specific growth cycles. Many growth factors play a fundamental role in these growth cycles. PRP releases growth factors and also stimulates molecular signaling pathways.<sup>1,2</sup> PRP increases phosphorylation of extracellular signal-regulated kinases and PI3-kinase/Akt signaling pathways that promote hair growth and prevent apoptosis.<sup>3,4</sup>

The main growth factors involved in the establishment of the hair follicle are platelet-derived growth factor, vascular endothelial growth factor, epidermal growth factor, transforming growth factor- $\beta$  (TGF  $\beta$ 1 and  $\beta$ 2), insulin 1-like growth factor, and fibroblast growth factor.<sup>3</sup> The growth factors are stored in the alpha granules of platelets that are released on activation by a process called degranulation. The growth factors are released within 10 minutes of activation by calcium chloride. Thus, PRP treatment to the affected area should be started immediately after its preparation. The procedure is safe and to date there are no side effects reported. There is rare possibility of transmission of infection if done under strict aseptic precautions. Pain during therapy is a limitation. However, in our study 90% of patients indicated they could tolerate the pain during procedure; in the remaining

patients, pain was alleviated with topical lidocaine and prilocaine or ring block.

In 2006, Uebel and colleagues were among the first to perform PRP along with hair transplantation in a small cohort of patients with AGA. They used follicular grafts dipped in PRP for 15 minutes for implantation, with saline as the control, which yielded an increase in the follicular density (range = 3%–52%) after 7 months of follicular unit transplantation.<sup>5</sup>

Gkini and colleagues studied the effect of PRP injections in 20 patients with AGA. They performed 3 sessions at an interval of 3 weeks and 1 booster session after 6 months. The results were based on noninvasive evaluation methods, such as hair pull test, hair density, dermoscopic photomicrographs, and patient satisfaction scale. The study showed a significant increase rate in hair density at 3 months ( $170.70 \pm 37.81$ ;  $P < .001$ ) and 6 months ( $156.25 \pm 37.75$ ;  $P < .001$ ), with reduction in hair loss compared with baseline.<sup>6</sup> This is a well-designed study with statistical analysis and relative objective evaluation methods, but no controls.

In a separate study, Sclafani—after a series of 3 intradermal platelet-rich fibrin matrix injections—observed a significant increase in hair density at 2 months ( $47.4\% \pm 22.7\%$ ;  $P = .0031$ ), 3 months ( $106.4\% \pm 56.9\%$ ;  $P = .0277$ ),

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and 6 months ( $75.1\% \pm 46.82\%$ ;  $P = .0606$ ) after the initial treatment.<sup>7</sup> This is also a well-designed study with relative objective evaluation methods, but no controls.

Schiavone and colleagues injected leukocyte PRP with the addition of concentrated plasmatic proteins in patients with AGA. Despite the large sample size, this study lacked controls and objective evaluation methods (interpretation of results using Jaeschke rating of clinical change).<sup>8</sup>

Singhal and colleagues investigated the clinical efficacy of PRP in treatment of AGA on 10 participants who were given autologous PRP over a period of 3 months at interval of 2 to 3 weeks and results were assessed. Three months after the treatment, the patients presented clinical improvement in the hair counts, hair thickness, hair root strength, and overall alopecia compared with no improvement in the control group.<sup>9</sup>

In a recent study, El Taieb and colleagues evaluated the efficacy of PRP injections in comparison with minoxidil 5% in 90 patients with alopecia areata. PRP was found more effective in treatment of alopecia areata than minoxidil 5% as evaluated by clinical and trichoscopic examination ( $P < .05$ ).<sup>10</sup>

Additionally, Kang and colleagues showed that CD34<sup>+</sup> cells containing PRP preparation when injected into 13 patients with AGA had overall clinical improvement ( $P = .023$ ) without major adverse effects.<sup>11</sup>

Our study has demonstrated PRP as an effective adjuvant therapy in AGA combined with microneedling. Microneedling enhances the efficacy of PRP. Pinpoint bleeding created by microneedling allows uniform absorption of PRP; on the other hand, the microinjury recruits growth factors, stimulates dermal papilla cells, and increases blood supply.<sup>10</sup> Greco and colleagues demonstrated PRP with microneedling in AGA patients. They observed a significant increase in hair diameter and its density, with this minimally invasive technique.<sup>12</sup>

Pain is a limiting factor in PRP therapy. Even with the use of local anesthesia patients complain of mild pain during the procedure. Postprocedure pain is minimal and patients are comfortable. Better methods to achieve anesthetic effects before injecting PRP should be further studied and investigated to make the procedure more pleasant both for the physician and the patient.

There are few publications on PRP followed by microneedling in AGA. Although our study showed that PRP was an effective treatment, it had its limitations including lack of tools to measure platelet concentration in the PRP prepared after centrifugation, proper evaluation methods, and a control group. In addition, no standard protocols exist on the various steps involved in preparation of PRP like centrifugation, temperature, platelet concentration measure, and evaluation methods, which are important in obtaining consistent results.

## CONCLUSION

PRP is a simple, nonsurgical, and cost-effective procedure in AGA. Though theoretical efficacy of PRP is proven, practical evidence is lacking. Yet, the procedure has shown reliable results in hair loss patients without any major side effects. PRP can be done as monotherapy or as adjuvant therapy in AGA. However, more population-based studies are required to demonstrate its efficacy as a monotherapy modality. ■

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