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ORIGINAL CONTRIBUTION

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Original article: Platelet-rich plasma with microneedling in androgenetic alopecia along with dermoscopic pre- and post-treatment evaluation

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Summary

Background: Platelet-rich plasma has shown beneficial effects in the treatment of androgenic alopecia with its growth factor properties in accelerating the dermal papilla. Dermoscopy is a noninvasive method that allows the in vivo evaluation of microstructures not visible to the naked eye.

Objective: To ascertain the role of platelet-rich plasma (PRP) with microneedling, and to compare the pre- and post-treatment dermoscopic features in androgenetic alopecia. (AGA).

Method: Patients with mild to moderate AGA, aged 18-45 years with Hamilton-Norwood score 1-5 were included in both study and control group. Dermoscopy was performed using Dermlite II hybrid m; 3Gen dermoscope at 10× magnification in polarized mode, and photographs were taken. Those not responding or those not having any new hair growth to conventional therapy for at least 1 year were included. The study group were given autologous platelet-rich plasma injections with microneedling over a period of 3 months at 3 weekly interval. Baseline and post-treatment photographs were taken.

Result: Hair growth started after the first session. The patients' satisfaction was more than 75% in 18 patients, on patients' subjective hair growth assessment scale. In post-PRP-treated patients of AGA, increase in the number of vellus and total hairs, increased hair shaft diameter, and reduction in yellow dots were appreciated after 3 sessions. Hair pull test was negative after treatment in 14 patients (70%).

Conclusion: This study reinforces the importance of dermoscopy in not only aiding in the diagnosis, but also in evaluation of pre- and post-treatment response of AGA.

KEYWORDS
androgenetic alopecia, dermoscopy, hair, microneedling, platelet-rich plasma

1 | INTRODUCTION

Androgenetic alopecia (AGA) is a hereditary, androgen-dependent dermatological disorder more common in men. Although the pathogenesis of androgenetic alopecia revolves around androgens, genes, inflammation, and signaling pathways, the conventional therapy options (finasteride and minoxidil) mainly target the androgens. About 40% of men with AGA go bald despite on conventional therapy.[1,2,3] The treatment modalities are limited, mainly minoxidil, 5-alpha-reductase inhibitors, and hair transplantation. These have numerous side effects ranging from hypertrichosis which is excessive hair growth, possible birth defects if given to women of childbearing

age, decreased libido, and the possibility of prolonged impotence. Treatment without these side effects is the need of the hour. Platelet-rich plasma (PRP) (*syn*. autologous platelet gel, plasma-rich growth factors, and platelet-concentrated plasma) means "abundant platelets that are concentrated into a small volume of plasma."[4] The pivotal discovery of platelet-derived growth factor (PDGF) in promoting wound healing, angiogenesis, and tissue remodeling threw light on this novel autologous therapeutic modality. The documented success of PRP in dentistry and surgery is shown by Marx and coworkers.[4]

2 | MATERIALS AND METHOD

Inclusion criteria: patient willing to participate in the study. Patients with mild to moderate AGA, aged 18-45 years with Hamilton-Norwood score 1-5 were included in both study and control group. Those not responding or those not having any new hair growth to conventional therapy (Minoxidil 5% and oral finasteride) for at least 1 year were taken in the study.

Exclusion criteria: patients with history of any platelets disorders, anemia, bleeding disorders, malignancy, and keloidal tendency; patients with positive viral markers (HIV1 and 2, Hepatitis B and C) or otherwise immunocompromised; and patients on nonsteroidal anti-inflammatory medications.

Ethical clearance was obtained. A control group of twenty patients were taken which included patients on minoxidil 5% lotion and oral finasteride 1 mg. Hair pull test was performed prior to the procedure, where a bundle of approximately 50-60 hair was grasped between the thumb, index, and middle finger from the base close to the scalp. The hair was firmly tugged away, and the extracted hair was counted in every session. Diagnosis of AGA was made in all patients based on a detailed medical history (any drugs causing hair loss), clinical examination, and laboratory tests. Laboratory tests included CBC; serum iron, serum ferritin, and TIBC (total iron-binding capacity); and T3, T4, TSH, VDRL, and viral markers. Dermoscopy was performed on a fixed area on the scalp (10 cm from the glabella and a fixed area in the right parietal region) using Dermlite II hybrid m; 3Gen dermoscope at 10× magnification in polarized mode, and photographs were captured.

Preparation of PRP: whole blood 15 mL was drawn by venipuncture, then collected in 15 mL of centrifuge tube containing anticoagulant (10:1.5), then centrifuged at 160 *g* for 10 min, and then plasma, buffy coat, and superficial RBC layer were aspirated; the second spin was carried out at 400 *g* for 10 min, and then the final concentration was reduced to one-fourth.

Procedure: area of the scalp was cleansed with spirit and povidone-iodine. Supratrochlear and supraorbital nerve block were given with lignocaine using an insulin syringe along with field block. With the help of insulin BD syringe, PRP was injected over affected area (multiple small injections few mm apart) under proper aseptic precaution in the minor operation theater. Microneedling (1.5 mm) was performed till pinpoint bleeding occured.

Baseline and post-treatment photographs (at 3 weekly interval) were taken (Figure 1-9) along with dermoscopic evaluation regarding yellow dots, hair shaft diameter, number of vellus hair.

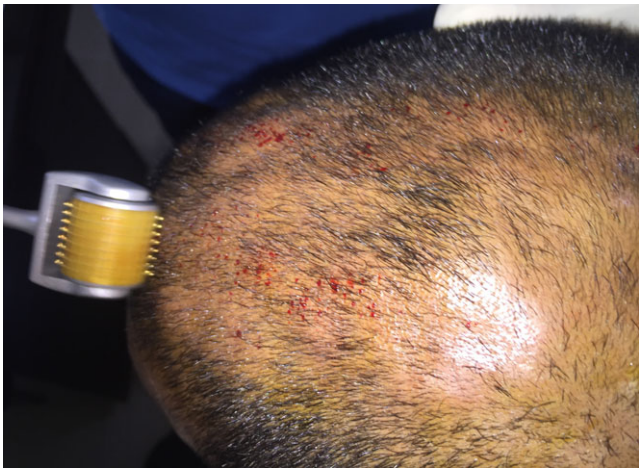

FIGURE 1 Pinpoint bleeding on microneedling

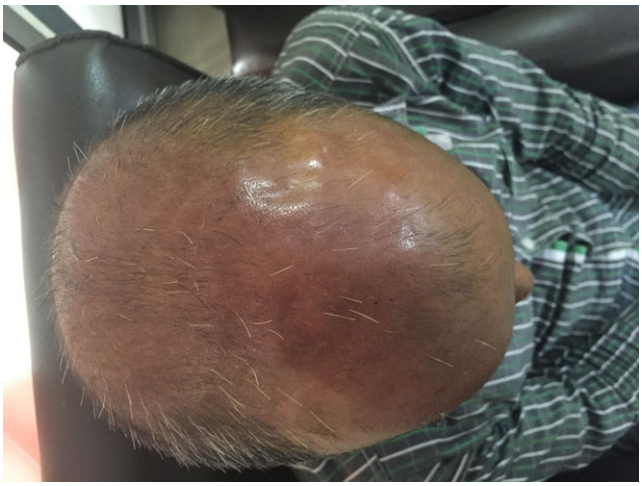

FIGURE 2 Pretreatment androgenetic alopecia

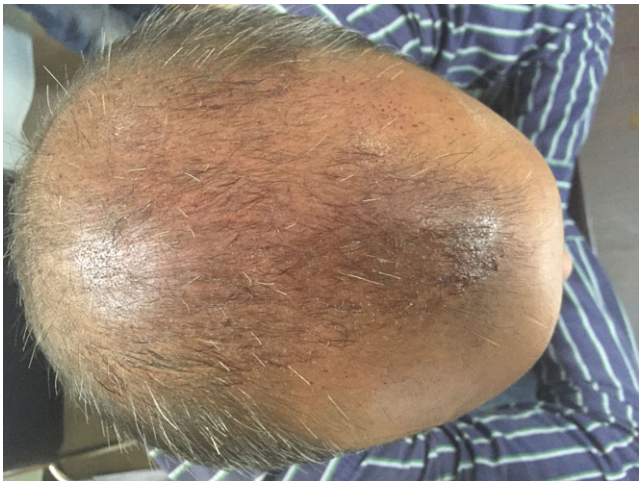

FIGURE 3 After 3 weeks of PRP with microneedling. PRP, platelet-rich plasma

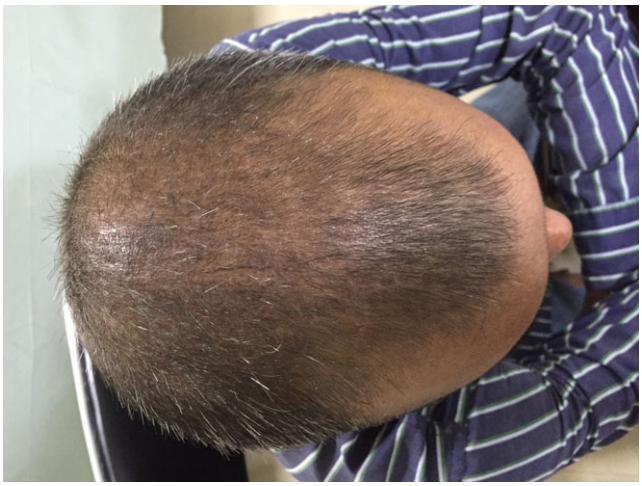

FIGURE 4 After 6 weeks of PRP with microneedling. PRP, platelet-rich plasma

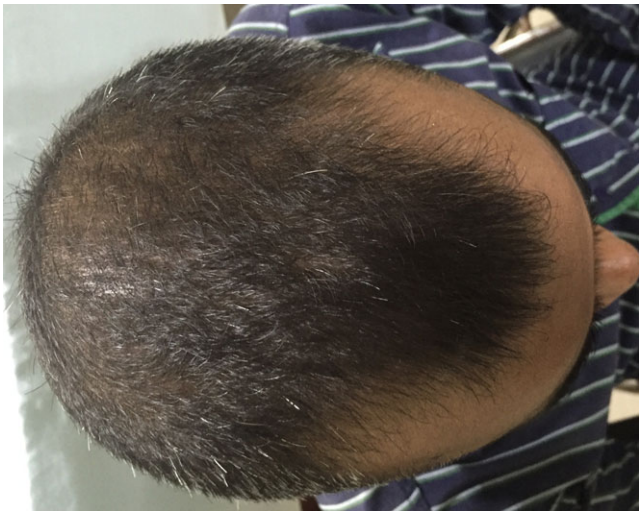

FIGURE 5 After 9 weeks of PRP with microneedling. PRP, platelet-rich plasma

3 | OBSERVATION AND RESULT

The response in the form of new hair growth started after the first session. The patients' satisfaction was more than 75% in eighteen patients, on patients' subjective hair growth assessment scale. In pre-treatment patients with AGA on dermoscopy thin, vellus hairs were increased along with variability in the hair shaft diameter of more than 20% of the hair shafts along with yellow dots (Figure 10). In addition, follicles in AGA showed the presence of single hair unlike normal unaffected follicles, which bear up to few terminal hairs. Advanced cases showed a prominent honeycomb pigment (Figure 11) pattern over the bald areas. In post-PRP-treated patients of AGA, increase in the number of vellus and total hairs, increased hair shaft diameter, dramatic reduction or disappearance of black/yellow dots (Figure 12-14), and reduction in hair pull test were appreciated (Table 1) after twelve weeks of 3 sessions of PRP in all patients. Hair

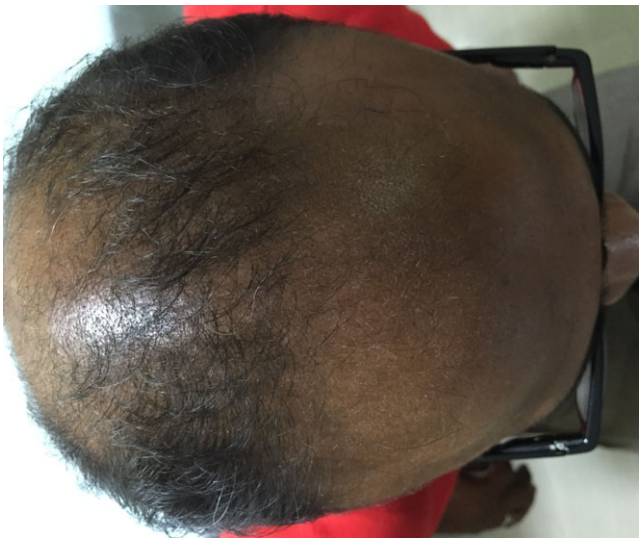

FIGURE 6 Pretreatment androgenetic alopecia

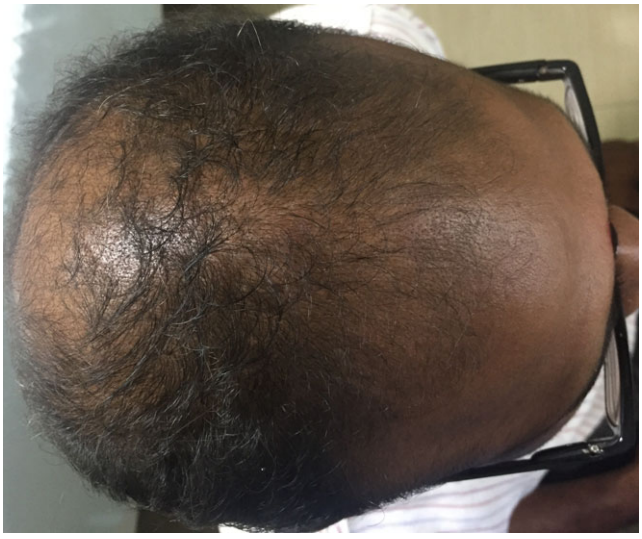

FIGURE 7 After 9 weeks of PRP with microneedling. PRP, platelet-rich plasma

pull test was negative after treatment in 14 patients (70%). Mild pain was complained in 7 patients, which subsided on the next day.

4 | DISCUSSION

Platelet-rich plasma is an effective concentration of multiple fundamental growth factors (GFs) by virtue of platelets alone (stored as α-granules in platelets) and plasma proteins, namely fibrin, fibronectin, and vitronectin. This cocktail of GFs is pivotal in modulation of tissue repair and regeneration,[5] whereas the plasma proteins act as a scaffold for the bone, connective tissue, and epithelial migration. PRP is prepared either manually or by the use of automated devices, in a day care setting just prior to the procedure. The process must be carried out under strict aseptic conditions as well as optimum

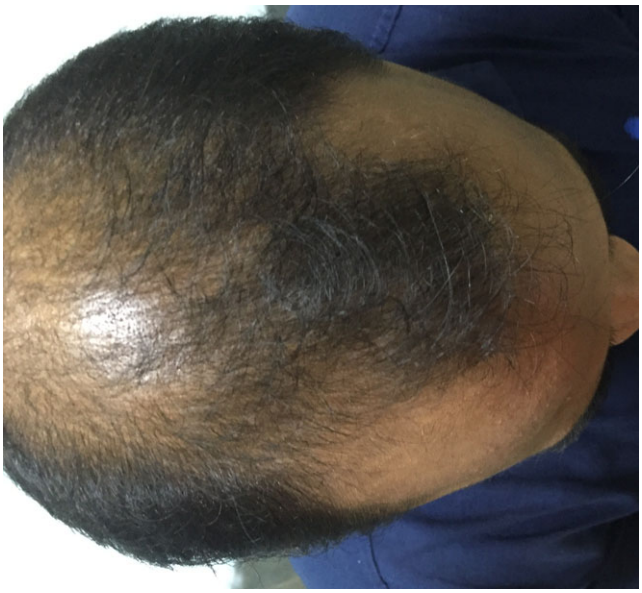

FIGURE 8 Pretreatment AGA. AGA, androgenetic alopecia

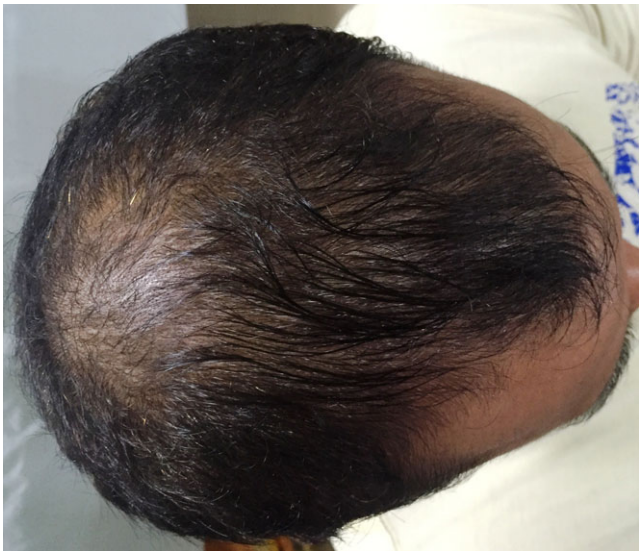

FIGURE 9 After 9 weeks of PRP with microneedling. PRP, platelet-rich plasma

temperature regulations, that is 20-22°C. To inhibit platelet aggregation, it is prepared with an anticoagulant, commonly using anticoagulant citrate dextrose solution formula A (ACD-A) or sodium citrate. Microneedling is a recent advancement to the treatment modality for AGA. Its efficacy has been established recently.[6] In another study, hair growth was seen in 6 patients after 7 days and in 4 patients after 15 days. By the end of 3 months, all 10 patients had good hair growth with PRP[7] whereas in our study, the hair growth was significantly seen in all patients. In another study, hair loss reduced, and at 3 months, it reached normal levels. Hair density reached a peak at 3 months with PRP [8] which was also seen in our study. In another study, there was significant reduction in hair pull

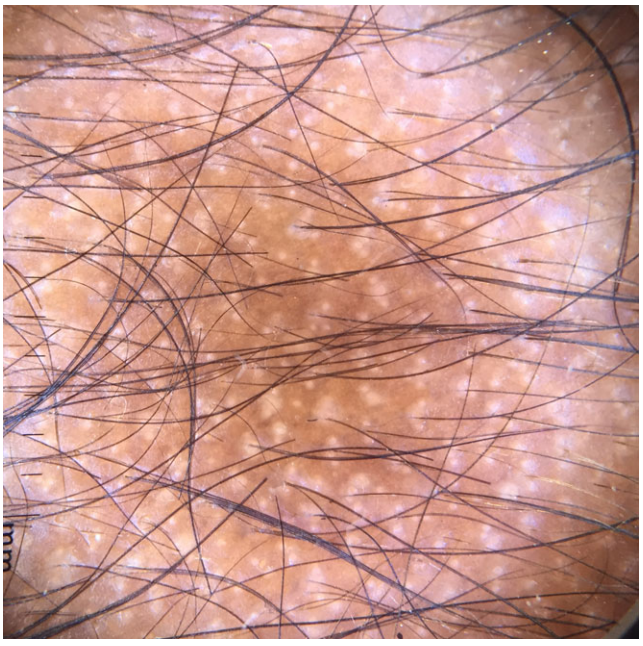

FIGURE 10 Yellow dots (on dermoscopy Polarised ×10)

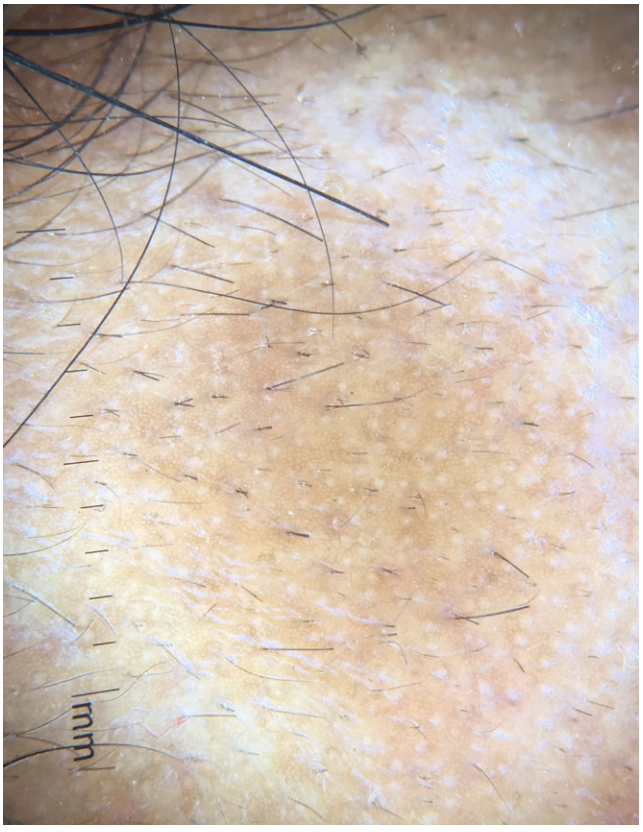

FIGURE 11 Honeycomb pattern, follicles in AGA showing presence of single and double hair (on dermoscopy Polarised ×10). AGA, androgenetic alopecia

test.[9] No adverse effect except mild pain was noted in our study. One interesting observation was selecting a patient with few vellus hair (seen on dermoscopy) in the frontal scalp not visible to naked

FIGURE 12 Variation in hair shaft diameter (on dermoscopy Polarised ×10)

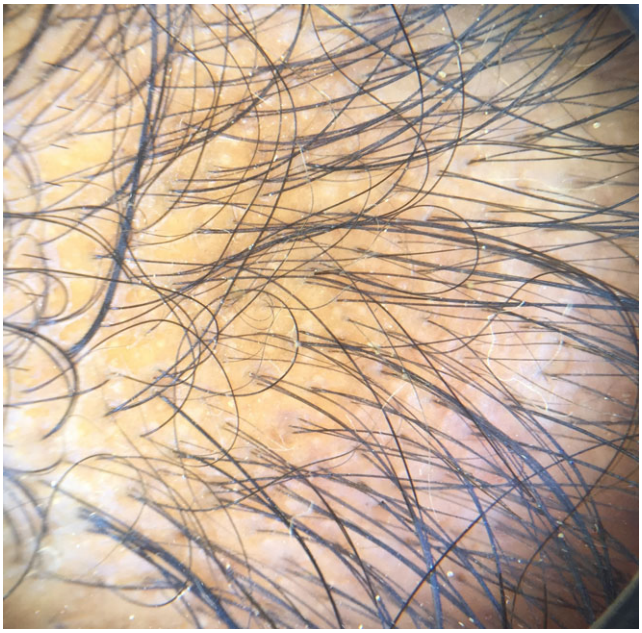

FIGURE 13 Increase in hair count (on dermoscopy Polarised ×10)

eye yielded significant hair growth after 3 sittings, making dermoscopic evaluation as an important evaluating modality in AGA.

5 | CONCLUSION

This study reinforces the importance of dermoscopy in not only aiding in the diagnosis, but also in evaluation of pre- and post-treatment response of AGA along with excellent response to PRP with microneedling in patients not responding to conventional therapy. To the best of our knowledge, this is the first study comparing the pre- and post-treatment of PRP with microneedling and correlating the findings dermoscopically.

FIGURE 14 Increase in shaft diameter and decrease in yellow dots after treatment (on dermoscopy Polarised ×10)

TABLE 1 Table showing grade of AGA patients selected along with hair pull test

Patient	Age	Norwood-Hamilton Scale grade	Hair pull test (before treatment)	Hair pull test (after 3 sessions of treatment)
1	24	2	6	0
2	25	2	6	1
3	32	3	8	2
4	30	4	9	1
5	22	2	8	0
6	24	2	3	0
7	29	3	3	0
8	35	3	2	0
9	38	5	8	1
10	26	2	7	0
11	21	2	4	0
12	28	3	4	0
13	34	5	6	0
14	31	4	8	0
15	40	5	10	2
16	25	2	2	0
17	24	3	5	0
18	28	3	4	0
19	27	2	6	1
20	25	2	2	0

AGA, androgenetic alopecia.

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