

A Prospective Study To Evaluate The Efficacy Of Platelet-Rich Plasma With Microneedling In Androgenetic Alopecia

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Abstract:Background: Platelet-Rich Plasma (PRP) has better efficacy when combined with dermaroller. Dermaroller stimulates proliferation and differentiation of stem cells in the hair follicles bulge area via multiple molecular mechanisms. **Methods:** Platelet-rich plasma (PRP) is a simple and safe procedure, which has been used for soft tissue and wound healing. PRP has been used in dermatology for skin rejuvenation and alopecia. They have emerged as new non-surgical treatment modalities for AGA, with minimal side effects and good safety profile. It is a promising treatment option in patients who cannot afford hair transplantation. **Results:** Total 90 patients included in this study, 15 were female and 75 were male patients. Their age varied from 22 to 48 years with a median age of 32 years. According to subjective scores (PSS), eight patients had excellent results, forty two had very good, 26 had good, 8 had fair results, and 6 (10%) did not have any response. Objective assessment scores (OAS) showed that eight patients had excellent results, 42 had very good, 26 had good, 8 had fair results, and 6 did not have any response. **Conclusion:** The effect of microneedling by dermaroller with PRP has shown a considerable increase in hair counts in the majority of the subjects in present study. Present study showed excellent results in patients treated with Platelet-Rich Plasma and Dermaroller. It is really a promising therapeutic modality with an excellent safety profile and patient satisfaction. [Shah R, Natl J Integr Res Med, 2025; 16(1):14-18, Published on Dated: 26/02/2025]

Key Words: Androgenic alopecia, Microneedling, Dermaroller, Platelet-Rich Plasma

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Introduction: The desire to remain permanently youthful explains the common dread of age-associated hair loss. For human beings, it has been associated with youthfulness and beauty in women and virility and masculinity in men.^{1,2,3} Human hairs are small, less pigmented, and miniaturised, and they help in evaporative heat loss by sweating. Protection from the environment has been provided by specialized hairs such as hairs inside the nostrils, eyelashes, external ears. Hair follicles have been found to play a role in wound healing, maintaining epidermal homeostasis and tumorigenesis.⁴ Hair loss can have a significant effect on the quality of life of a person and make him, or she feel self-conscious. A prompt diagnosis of different types of alopecia's and early intervention is worthwhile when dealing with these patients.⁵

Androgenetic alopecia (AGA), which is also known as male and female pattern hair loss (FPHL), is a highly prevalent disorder that affects members of every society. Evidence suggests since ancient times AGA has been a health concern. Egyptian papyrus dating as early as 4000 BC list many remedies to treat hair loss; for

example, a mixture of fats from hippopotamus, crocodile, tomcat, snake, ibex, and porcupine hair was boiled in water and applied to the scalp for four days.³ Androgenetic alopecia (AGA) is a genetically determined progressive noncicatricial hair loss usually with a characteristic pattern that affects both genders. The hair thinning begins after puberty and increases in frequency and severity with age.

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

Androgenetic alopecia (AGA) is a hereditary, androgen-dependent disorder of hair which is very common among men as well as women. Besides being an aesthetic concern, for both patient and physician, AGA is a common cause of psychosocial stress among both sexes. The treatment modalities are limited to topical minoxidil and oral/topical finasteride. Though

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these are FDA-approved, concern about long-term efficacy and safety profiles lowers patients' compliance and this in turn paved way for this newer modality of treatment without any adverse effects. Our aim was to show the efficacy of PRP along with microneedling in such patients, simultaneously assessing the number of sessions required.

Hair growth cycle is regulated by different Growth Factors. Platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), transforming growth factor beta (TGF b1 and b2), insulin 1-like growth factor (IGF-1), and fibroblast growth factor (FGF)¹³ are the major growth factors involved in the hair follicle formation. The growth factors are stored in the alpha granules of platelets which are released on activation by a process called degranulation. PRP releases growth factors from the platelet concentrate and also stimulates molecular signaling pathways.^{12,14} PRP increases phosphorylation of extracellular signal-regulated kinases (ERK) and PI 3-kinase/Akt signaling pathways which promote hair growth and prevent apoptosis.^{13,14,15} The procedure is safe and till date there are no side effects reported. There is rare possibility of transmission of infection if done under strict aseptic precautions. Pain during the therapy is a limitation. Ninety percent of the patients could tolerate the pain during procedure and in the remaining it was alleviated with topical EMLA, vibration anesthesia.

Present study is conducted keeping in mind objective 1. To evaluate and study efficacy of PRP with micro-needling in patients with androgenetic alopecia & 2. To assess number of Platelet-Rich Plasma with Microneedling sessions required for a patients with androgenetic alopecia (AGA).

Material & Methods: This is a prospective interventional study conducted in Index Medical College hospital And Research center Indore, including 90 subjects. Ninety patients diagnosed with Androgenetic alopecia were studied who did not respond to minoxidil and finasteride.

Exclusion criteria includes patients who have history of platelets disorders, anemia or bleeding disorders, immunocompromised patients, uncontrolled diabetes mellitus, keloidal tendency, malignancies, women who were

pregnant or breastfeeding, and patients with unrealistic expectations. Patients were advised to continue topical minoxidil throughout the sessions.

PRP was prepared by centrifugation of patients' blood. PRP with microneedling was done for all patients under aseptic conditions. Patients were given PRP with dermaroller monthly once for 4 months. Informed consent was taken from patients. History, clinical examination and relevant investigation was done using a systematically designed proforma. Subjective and objective scores were assessed based on a visual analog global score. Assessment was done at the first session, every next sitting, and 4 weeks after the last sitting. Follow-up was done at 3rd and 5th month after the last sitting.

Clinical and dermoscopic analysis was done at baseline, 3rd months and 5th months. The efficacy was assessed using primary efficacy analysis, secondary efficacy analysis and visual analogue scale.

Result: Total 90 patients included in this study, 15 were female and 75 were male patients. Their age varied from 22 to 48 years with a median age of 32 years.

According to subjective scores (PSS), eight patients had excellent results, forty two had very good, 26 had good, 8 had fair results, and 6 (10%) did not have any response. Objective assessment scores (OAS) showed that eight patients had excellent results, 42 had very good, 26 had good, 8 had fair results, and 6 did not have any response.

After first session, 62 patients had less than 40% improvement. After the last session, 76 patients had more than 40% improvement. Patients noticed improvement in terms of reduced hair fall and improvement in hair thickness. An attempt was made to assess the minimum number of sessions required for satisfactory results. Out of 90, all patients underwent four sessions. In present study included 90 patients who took four sessions, six patients did not have any improvement, eight patients had fair results, and 76 patients had good to excellent results with significant *P*-value.

Distribution of the patients according to the Primary Efficacy Analysis for both treatment arm at 3 and 5 months' time point - It was observed

that the variation at 5 months as compared to 3 months was significant in Majority of patients with Platelet-Rich Plasma (PRP) combination with dermaroller improved moderately. The number of patients whose clinical picture worsened was higher for only minoxidil treatment.

Distribution of the patients according to the Secondary Efficacy Analysis for each treatment at 3 and 5 months' time point - It was observed that the variation at 5 months as compared to 3 months was significant in all patients. Majority of the patients improved in treated by Dermaroller plus Platelet-Rich Plasma (PRP) combination treatment type. Worsening of the cases was seen in patients treated with only 5% minoxidil.

Comparison of the Dermoscopic analysis for improvements in treatment at three points of time - Dermoscopic analysis was used to depict the effect of treatment in all patients and baseline data was compared with results at 3 month and 5 months of study period. Maximum improvement was observed in group treated with Dermaroller and PRP followed in comparison to minoxidil only.

Discussion: PRP has been emerging treatment for hair loss. Literature has many publications, and in the last many years, there are increasing numbers of articles favoring PRP treatment for alopecia. PRP is defined as an autologous concentration of platelets in plasma fraction of blood prepared from the patient's venous blood. The blood thus drawn is subjected to differential centrifugation to separate platelets from RBCs. The desired platelet concentration is five to six times above the baseline platelet count which is 200,000 cells/ μ L.

The present, prospective interventional study was conducted on cases of androgenetic alopecia in the age group 22-48 years, attending outpatient department of Dermatology Venereology and Leprosy in Index Medical college hospital and research center, Indore. The study aimed to observe the efficacy of treatment with PRP and dermaroller.

In present study, Platelet-Rich Plasma was prepared using single spin technique using Platelet-Rich Plasma tubes prefilled with anti-coagulant and cell separator. Centrifugation at 3500 RPM for 10 min was done. As stated earlier,

Platelet-Rich Plasma is rich in several Growth Factors. Activator used was calcium chloride in the ratio of 1:9 to Platelet-Rich Plasma. Platelet-Rich Plasma can be either injected directly (subdermal or intradermal) or can be applied topically after microneedling. When PRP comes in contact with the skin/dermal collagen after microneedling it gets activated automatically; hence no need of activator.¹² Activator can be used when direct Platelet-Rich Plasma injections are given. The Growth Factors are released within 10 min of activation by CaCl_2 .¹³ Hence; Platelet Rich Plasma treatment to affected area should be started immediately after addition of activator.

In present study, a dermaroller of 1.5 mm needles was used to microneedle on scalp in vertical, horizontal, and crisscross directions. Microneedling has several benefits. The pinpoint bleeding/pores created due to microneedling ensures uniform absorption of PRP in the affected areas, thus enhancing its efficacy. In contrast, the micro-injury caused by microneedling itself recruits growth factors such as epidermal growth factor and platelet growth factor through platelet activation and wound healing mechanism and increases expression of Wnt proteins which in turn stimulate dermal papillae cells and increase blood supply.^{17, 18}

Present study has demonstrated PRP as an effective, adjuvant therapy in Androgenetic alopecia when combined with microneedling. Studies with such combination are very less. Jha *et al.*¹⁹ reported in 2019 that PRP with microneedling had better outcome in Androgenetic alopecia when compared with PRP alone or with minoxidil. This study was done on 93 patients. In another study, Jha *et al.*²⁰ in 2018, noted significant hair growth after three sessions of PRP with microneedling and their results were assessed dermoscopically also. The patient satisfaction score was 75% in 18 patients in their study.

In the present study the patients treated by Dermaroller and Platelet-Rich Plasma (PRP) combination improved moderately to excellent. At the end of 3 months about 48 % patients treated by Dermaroller and PRP, improved moderately to excellent, which increased to 68% at the end of 5 months. This difference was statistically significant. While in a study done by Vaaruniet al.⁸ showed excellent improvement in

60% patients who were treated with Platelet-Rich Plasma (PRP) and Dermaroller.

Shah *et al.*²² also performed a comparative study in 2017 of Platelet-Rich Plasma with microneedling plus minoxidil in one group and topical minoxidil alone in another group. The group who received Platelet-Rich Plasma with microneedling group has significant improvement ($P < 0.005$) when compared with the control group. Greco and Brandt²³ demonstrated Platelet-Rich Plasma with microneedling in Androgenetic alopecia patients. They observed a significant increase in hair diameter and its density, respectively, with this minimally invasive technique. Microneedling using a dermaroller creates multiple microchannels and increase transdermal penetration of drugs, facilitating higher concentration in dermis.²⁴

There are many studies showing microneedling treatment alone in AGA patients. Dhurat *et al.*¹⁸ in 2013 conducted a randomized evaluator-blinded controlled study on 100 patients. The study showed significant improvement of hair count ($P = 0.0039$) in patients who underwent dermaroller along with minoxidil when compared with those with minoxidil treatment only. Another study by Dhurat *et al.*,²⁵ in 2015, shows that microneedling was done in four patients not responding much to medical treatment. These patients showed 50–75% improvement in hair growth after microneedling. This study shows that microneedling can augment the conventional treatment in Androgenetic alopecia.

Conclusion: Male androgenetic alopecia is seen commonly in middle-aged men due to genetic, hormonal and environmental factors. It has been shown to disrupt body image, reduced self-esteem and increased stress as reflected in the increased demand for treatment.

We can conclude from present study that Platelet-Rich Plasma (PRP) with microneedling is an effective way of treating Androgenetic alopecia. Present study also shows that PRP augments the effects of conventional therapy like minoxidil and finasteride.

Platelet-Rich Plasma (PRP) has better efficacy when combined with dermaroller. Platelet-Rich Plasma (PRP) and dermaroller stimulate proliferation and differentiation of stem cells in

the hair follicles bulge area via multiple molecular mechanisms. Hence, Platelet-Rich Plasma (PRP) with micro-needling is a simple cost-effective and feasible treatment option in patients with androgenetic alopecia with high overall patient satisfaction.

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