



ORIGINAL RESEARCH PAPER

Dermatology

A COMPARATIVE STUDY OF COMBINED MICRONEEDLING PLUS PLATELET-RICH PLASMA THERAPY VERSUS MICRONEEDLING ALONE IN 50 PATIENTS OF ANDROGENIC ALOPECIA

KEY WORDS: Platelet-rich plasma (PRP), platelet growth factors, alopecia, androgenetic alopecia, dermaroller, microneedling.

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ABSTRACT

Scalp hair complete the body self-image and patients who have alopecia suffer from overt disfiguration, which may cause psychosocial embarrassment and lack of self-esteem.^[1] Platelet-rich plasma therapy and microneedling have been investigated recently as potential therapeutic options for the treatment of hair disorders. Evidence from laboratory studies indicates that these treatments enhance growth factor production that in turn facilitates hair follicle development and cycling. Several small studies and case reports have presented encouraging findings regarding the use of these treatments for androgenic alopecia.^[2,3] This prospective study based on preliminary results by performing a prospective study in 50 patients divided equally in 2 groups to analyze and compare the efficacy of platelet-rich plasma plus microneedling and microneedling alone so that better method of these two can be predicted and applied on large scale of patients.

INTRODUCTION:

Androgenetic alopecia is the most common type of baldness clinically characterized by progressive hair loss. Highest prevalence is found in caucasians affecting up to 80% caucasian men and 40% women. A population based study comprising of 1,005 Indian males aged 30–50 years showed a 58% prevalence of androgenic alopecia. The frequency of androgenic alopecia increases with age, even though it may start at puberty.^[4,5]

Currently, The Hamilton-Norwood Classification System for males and The Ludwig System for females are most commonly used for the description of pattern of hair loss.^[6,7]

Platelet-rich plasma and microneedling have emerged as new treatment modalities in regenerative plastic surgery, dermatology and increasingly more literature suggests that it might have a beneficial role in hair regrowth.^[8,9]

In this study we will try to determine the result based comparison between PRP plus microneedling and microneedling alone in group of 50 patients of Androgenetic alopecia.

AIMS AND OBJECTIVES:

- To analyze and compare the efficacy of PRP plus microneedling and microneedling alone
- To assess patient satisfaction in the above 2 modalities of treatment.

MATERIALS AND METHODS:

1. Study design: Prospective study
2. Study population:

50 patients with androgenic alopecia were selected on the basis of inclusion and exclusion criteria. These patients were randomly divided into two groups of 25 patients each.

- Group a: Microneedling plus Platelet-Rich Plasma Therapy
- Group b: Microneedling alone.

3. Study duration:

Observational study from January 2020 To December 2021

4. INCLUSION CRITERIA:

- Presenting with patterned hair loss.
- Not taking any treatment for last 6 months.

- Patients of age group 25-55 years
- Patients who will give written informed consent

5. EXCLUSION CRITERIA:

- Patients with alopecia other than androgenic alopecia, such as alopecia areata, alopecia totalis, telogen effluvium, anagen effluvium, and acquired cicatricial alopecia.
- Patients with history of bleeding disorders
- Patients on anticoagulant medications (aspirin, warfarin, heparin)
- Patients with active infection at the local site
- Patients with keloid tendency
- Patients with history of psoriasis or lichen planus because of risk of koebner phenomenon
- Hepatic, renal disease, epilepsy, or any major medical illness
- Patients with unrealistic expectations
- Patients not giving consent

Procedure details:

1. Platelet rich plasma preparation:

After obtaining informed consent 10 ml blood sample was aspirated using 18g needle and collected in ACD vacutainer tube (ACD solution a contains trisodium citrate (22.0g/l), citric acid (8.0g/l) and dextrose (24.5g/l). The first centrifugation or “soft spin” was carried out at 1200 rpm for 8 minutes and the separated buffy coat with platelet poor plasma was collected with the help of a pipette in another test tube. This tube underwent a second centrifugation, a faster “hard spin at 2400 rpm for 4 minutes. The upper layer containing platelet poor plasma was discarded and the lower layer of platelet-rich plasma was taken for platelet count.

2. Microneedling instrument:

Microneedling using a derma roller having 192 needles of 1.5-mm length each.

We used ZGTS derma roller system in our study.

3. Administration of local anesthesia:

Topical application of prilocaine 2.5%w/w plus lignocaine 2.5%w/w under occlusion for 45 minutes before procedure.

4. Preparation of scalp:

Scalp was prepared with spirit and normal saline following topical anesthesia.

5. Microneedling procedure:

Under aseptic precautions, rolling was done with dermaroller with needle length 1.5 mm over affected areas in longitudinal, vertical, and diagonal directions, 8 times in each direction or until pinpoint bleeding was noted which was considered as the end point.

6. Platelet rich plasma therapy plus microneedling procedure:

- Rolling was done with dermaroller with needle length 1.5 mm over affected areas in longitudinal, vertical, and diagonal directions, 8 times in each direction or until pinpoint bleeding was noted which was considered as the end point.
- This activation of scalp with microneedling was followed by PRP injections 0.05 ml per 1 cm square in a retrograde fashion from deep to superficial at every centimeter over the treatment area, and then application of extracted plasma on the activated site and massaging was done to allow it to percolate through the epidermis.
- One more session of microneedling after injection of PRP and left overnight.

7. Follow up sessions:

- Total 5 similar sessions with 1 month interval each were given to every patient according to group of study they included.
- All the observational data has been collected as per need of study.

RESULTS:

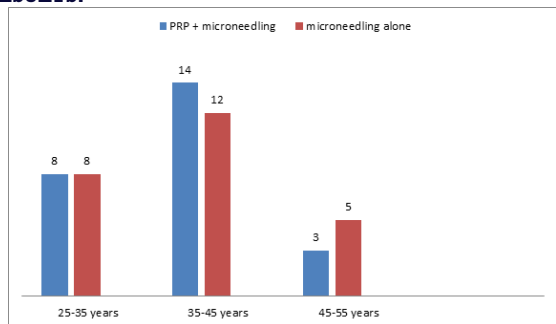


Table 1- age distribution in both groups.

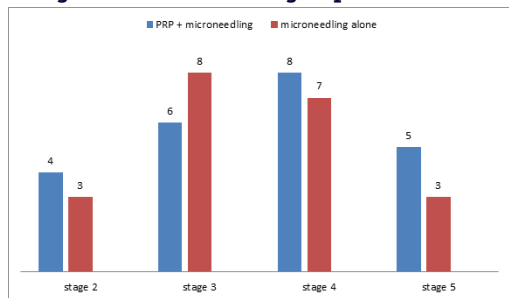


Table 2- hair grading in both groups according to norwood hamilton grade.

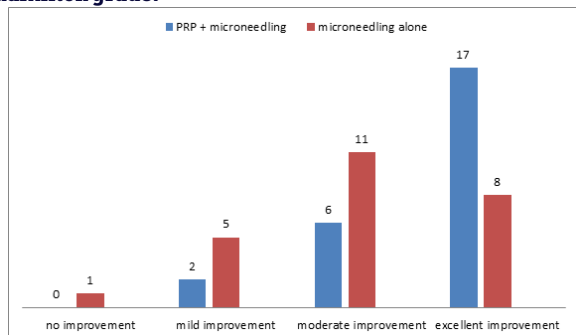


Table 3- comparison of patients' assessment at the end of 6 months between two groups

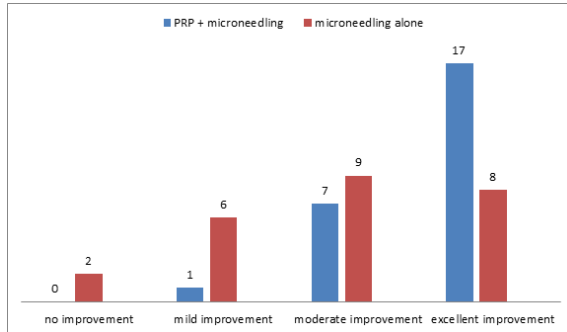


Table 4- comparison of investigator assessment at the end of 6 months between two groups

Outcome of study:

parameters	Microneedling therapy alone	Microneedling plus Platelet-Rich Plasma Therapy
Effect of treatment	Observable decrease in hair loss noticed after 2 sessions	Observable decrease in hair loss noticed after 1 session
Visible new hair growth	On dermoscopy- 2 months On naked eye- 4 months	On dermoscopy- 1 month On naked eye- 3 months
Experience of pain	Less painful	PRP injections make this therapy more painful comparatively
Affordability	approximately costs 300 for all 6 sessions of dermaroller in our hospital set up	Apart from cost of dermaroller , preparation of PRP and administration costs negligible
Recurrence	our of 25, in 2 patients we have observed unsatisfactory decrease in hair fall after completion of 6 sessions of microneedling probably warrants more sessions in future	all 25 out of 25 patients showed better and satisfactory outcome and maintenance of steady hair growth after completion of 6 sessions
Hair density	Comparatively lesser density hairs	statistically significant increase in density
Hair thickness	Mildly satisfactory thickness noticed	Thicker and more satisfactory thickness noticed

Table 5- Comparison of various parameters after completion of study duration of 1 year

DISCUSSION:

Platelet-rich plasma (PRP) is defined as an autologous preparation of plasma with concentrated platelets. PRP contains high concentrations of over 20 growth factors that are actively secreted from the -granules of platelets. Among those thought to stimulate hair regrowth are platelet-derived growth factor, transforming growth factor, vascular endothelial growth factor (VEGF), epidermal growth factor, fibroblast growth factor, connective tissue growth factor, and insulin-like growth factor IGF-1.^[10]

These essential proteins regulate cell migration, attachment, proliferation, and differentiation and promote extracellular matrix accumulation.^[11,12]

Growth factors in PRP promote hair regrowth by binding to

their respective receptors expressed by stem cells of the hair follicle bulge region and associated tissues. Upon ligand binding, stem cells induce the proliferative phase of the hair follicle, producing the anagen follicular unit and facilitating hair regrowth.^[11,13]

There is a need for adjuvant and newer modalities of treatment to look forward for therapy which gives faster and better results. Microneedling using dermaroller creates multiple microchannels and increases transdermal penetration of drugs, facilitating higher concentration in dermis.

There are very few studies evaluating the efficacy of platelet-rich plasma in hair restoration and its combination with dermaroller.

Regarding microneedling, evidence from animal studies suggests that this method also enhances growth factors that mediate hair follicle development and cycling.

It has been observed in our study and in accordance with study done Kim et al in 2014 that by microneedling may also facilitate transdermal drug delivery.

In one study involving disk microneedle rollers, drug penetration was found to increase with greater microneedle length, whereas rollers without microneedles failed to result in penetration of the experimental dye. These results suggest that microneedling could be a valid method for increasing delivery of PRP which we can assume considering our compared parameters^[19]

CONCLUSION:

When microneedling and PRP therapy are combined, it essentially opens channels directly to hair follicles so that the PRP can stimulate and heal hair follicles, and most importantly, encourage hair growth. Body's healing response to the micro wounds acts like an accelerator for the PRP.

Thus, our results show that microneedling in combination of PRP therapy is a safe and a promising tool in hair stimulation and for faster re-growth of hair in androgenetic alopecia requires more than few monthly sessions and alleviate need of hair transplant.

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Nil.

Conflicts of interest

No

Tables:

- Table 1- age distribution in both groups.
- Table 2- hair grading in both groups according to norwood hamilton grade.
- Table 3- comparison of patients' assessment at the end of 6 months between two groups
- Table 4- comparison of investigator assessment at the end of 6 months between two groups
- Table 5- Comparison of various parameters after completion of study duration of 1 year

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