INTRODUCTION

Androgenetic alopecia (AGA) or common baldness is the result of progressive, patterned hair loss that occurs when genetically predisposed individuals are exposed to androgens.[1]

AGA occurs by androgen-mediated conversion of terminal hairs to vellus hairs.[2] By far, the most promising approaches to the treatment of AGA are drug therapies, such as minoxidil and finasteride.[3] These may not always be effective, take long time to show results and may be sometimes associated with unacceptable side effect of sexual dysfunction. Hence, 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.[4,5]

There are very few studies evaluating the efficacy of platelet-rich plasma (PRP) in hair restoration and its combination with microneedling. As far as ascertained, there is no study to evaluate efficacy of microneedling with PRP plus topical minoxidil (5%) versus topical minoxidil (5%) alone in androgenetic alopecia (AGA). Aims: This study aims (1) to compare the efficacy of (a) topical minoxidil (5%) alone and (b) topical minoxidil (5%) + microneedling with PRP in men between 18 and 50 years with AGA Grade III to V vertex (Norwood–Hamilton scale) and (2) to perform objective and subjective evaluation based on clinical improvement and photographic evidence. Settings and Design: The study was conducted in the outpatient department of dermatology, venereology, and leprology in a tertiary care hospital. It was open, prospective study. Subjects and Methods: Fifty patients with AGA were selected on the basis of inclusion and exclusion criteria. These patients were randomly divided into two groups of 25 patients each and were given following treatment: (i) Group A: topical minoxidil (5%) alone and (ii) Group B: topical minoxidil (5%) + microneedling with platelet-rich plasma (PRP). Statistical Analysis Used: Patients were assessed before starting the treatment and at the end of 6 months on the basis of (a) Patient’s self-assessment based on standardized seven-point scale compared with baseline (b) Physician’s assessment based on standardized seven-point scale of hair growth compared with baseline. Results: There was a significant improvement ($P < 0.05$) in both patients’ assessment and investigator’s assessment in Group B as compared to Group A at the end of 6 months. Conclusions: Microneedling with PRP is safe, effective, and a promising tool for the management of AGA.

Key words: Androgenetic alopecia, microneedling, minoxidil, platelet-rich plasma
combination with dermaroller. As far as ascertained, there is no study to evaluate efficacy of microneedling with PRP plus topical minoxidil (5%) versus topical minoxidil (5%) alone in AGA.

Aims and objectives of this study were
- To analyze and compare the efficacy of topical minoxidil (5%) alone and topical minoxidil (5%) + microneedling with PRP.

In men, between 18 and 50 years with AGA Grade III to V vertex (Norwood–Hamilton scale).
- To perform objective and subjective evaluation based on clinical improvement, photographic evidence
- To observe untoward events or side effects, if any.

SUBJECTS AND METHODS

Fifty patients with AGA were selected on the basis of inclusion and exclusion criteria. These patients were randomly divided into two groups of 25 patients each.
- Group A: topical minoxidil (5%) alone
- Group B: topical minoxidil (5%) + microneedling with PRP.

Inclusion criteria
- Patients willing for the procedure
- Patients in the age group of 18–50 years
- Patients with AGA Stage III–V Hamilton–Norwood classification
- Patients who have not taken any form of treatment, at least in the past 6 months.

Exclusion criteria
- Patients with alopecia other than AGA, 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 keloidal 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
- Patients who could come for regular follow-up were selected and included in the study. After taking the written and informed consent, patients were enrolled in the study and procedure was started
- For Group A:
  - Patients were instructed to apply topical 5% minoxidil in a dose of 1ml twice daily during the treatment period.
- For Group B:
  - Patients were instructed to apply topical 5% minoxidil in a dose of 1ml twice daily during the treatment period. They also received treatment in the form of microneedling with PRP once at the interval of a month for 6 sittings.

Microneedling with PRP:
- Scalp was prepared with betadine and normal saline following topical anesthesia. 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 mild erythema was noted which was considered as the end point. This activation of scalp with microneedling was followed by PRP injections 0.05 ml per 1cm 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 and left overnight
- A total of 6 such sittings were given to each patient at an interval of 1 month, over a total period of 6 months after which topical therapy with minoxidil was continued. Patients were instructed not to alter their hair style or dye their hair during the study period
- Patients were assessed before starting the treatment and at the end of 6 months on the basis of:
  - Patient’s self assessment based on standardized seven point scale compared with baseline which is shown in Table 1.
  - Physician’s assessment based on standardized seven point scale of hair growth compared with baseline which is shown in Table 2.

Table 1: Patient’s assessment of improvement on 7-point scale

| Score | Description               |
|-------|---------------------------|
| -3    | Severe hair fall          |
| -2    | Moderate hair fall        |
| -1    | Mild hair fall            |
| 0     | No change                 |
| +1    | Mild Improvement          |
| +2    | Moderate Improvement      |
| +3    | Excellent Improvement     |
• Patient’s self-assessment
  • The patients’ perception of improvement in the degree of hair fall and hair growth was evaluated from the baseline on a seven-point scale

• Physician’s assessment
  • Physician assessed the standardized color photographs taken at baseline and at the end of 3 months and 6 months. The photographs were taken with fixed position, angle, light, magnification, and distance (8 cm) using SONY DSC TX-55. The photographed area included vertex, midline frontal, and temporal regions. These photographs were assessed on a standard seven-point scale at the end of 6 months, and following scores were noted:
  • Hamilton–Norwood scale for male pattern hair loss was used, and subsequent improvement in the grading was noted.

RESULTS

About 40% (n = 10) patients in Group A and 44% (n = 11) patients in Group B were in age group 21–30 years whereas 28% (n = 7) patients in Group A and 32% (n = 8) patients in Group B were in age group 31–40 years. Average age in Group A and B were 30.04 and 31.12 years, respectively, which were comparable, and difference was not statistically significant (P > 0.05) (Chi-square test). Nearly, 62% (n = 31) patients had hair loss duration of 1–5 years. Maximum duration of hair loss was of 15 years, for three patients seeking advice. There was not much difference in duration of hair loss of the patients in both the groups. In the study of total fifty male patients, 25 (50%) patients had Grade III alopecia, and 16 (32%) patients had Grade IV alopecia. Maximum patients were of Grade III alopecia. Family history was positive in 54% (n = 27) patients in our study. As shown in Table 3, there is a significant improvement (P < 0.05) in patients’ assessment in Group B as compared to Group A at the end of 6 months. As shown in Table 4, there is a significant improvement (P < 0.05) in investigator’s assessment in Group B as compared to Group A at the end of 6 months. As shown in Table 5, there is a significant improvement (P < 0.05 using paired sample t-test) in platelet count in PRP compared to whole blood. The results of group A are shown in Figures 1-4 and the results of group B are shown in Figures 5-8 which shows that there is significant improvement in group B patients when compared to group A patients.

DISCUSSION

In a study done by De Villez,[6] average age of patients with male pattern baldness was 36.9 years; while in a study done by Hajheydari et al.[7] it was 22.8 years. In our study, average age of patients with male pattern baldness was 30.6 years. In a study done by Hajheydari et al.,[7] average time of hair loss was 23.10 months, while in our study, it was 54.54 months. In a study done by Krupa Shankar et al.,[8]
Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Sinclair RD. Disorders of hair. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. Rook's Textbook of Dermatology. 8th ed. Vol. 4. UK: Blackwell Publishing Ltd.; 2010: p. 66.16-66.31.

2. Wadhwa SL, Khopkar U, Nishtar KC. Hair and scalp disorders. In: Valia RG, Valia AR, editors. IADVL Textbook of Dermatology. 3rd ed. India: Bhalani Publishing House; 2008. p. 887-94.

3. Paas R, Olen EA, Messenger AG. Hair growth disorders. In: Wolff K, Goldsmith LA, Katz SI, Gilchrest BA, Paller AS, Leffell DJ, editors. Fitzpatrick's Dermatology in General Medicine. 7th ed. USA: The McGraw-Hill Companies, Inc; 2008. p. 766-9.

4. Vedamurthy M. Mesotherapy. Indian J Dermatol Venereol Leprol 2007;73:60-2.

5. Escobar-Chávez JJ, Bonilla-Martínez D, Villegas-González MA, Molina-Trinidad E, Casas-Alancaster N, Revilla-Vázquez AL. Microneedles: A valuable physical enhancer to increase transdermal drug delivery. J Clin Pharmacol 2011;51:964-77.

6. De Villeg RL. Topical minoxidil therapy in hereditary androgenetic alopecia. Arch Dermatol 1985;121:197-202.

7. Hajheydari Z, Akbari J, Saeedi M, Shokoohi L. Comparing the therapeutic effects of finasteride gel and tablet in treatment of androgenetic alopecia. Indian J Dermatol Venerol Leprol 2009;75:47-51.

8. Krupa Shankar D, Chakravarti B, Shilpakar R Male androgenetic alopecia: Population-based study in 1,005 subjects. Int J Trichology 2009;1:131-3.

9. Paik JH, Yoon JB, Sim WY, Kim BS, Kim NL. The prevalence and types of androgenetic alopecia in Korean men and women. Br J Dermatol 2001;145:95-9.

10. Betsi EE, Germain E, Kalbematten PF, Tremp M, Emmenegger V. Platelet-rich plasma injection is effective and safe for the treatment of alopecia. Eur J Plast Surg 2013;36:407-12.

11. Dhurat R, Sukesh M, Avhad G, Dandale A, Pal A, Pund P. A randomized evaluator blinded study of effect of microneedling in androgenetic alopecia: A pilot study. Int J Trichology 2013;5:56-11.

12. Greco J, Brandt R. The effects of autologous platelet-rich plasma and various growth factors on non-transplanted miniaturized hair. Hair Transpl Forum Int 2009;19:49-50.

13. Kang JS, Zheng Z, Choi MJ, Lee SH, Kim DY, Cho SB. The effect of CD34 cell containing autologous platelet-rich plasma injection on pattern hair loss: A preliminary study. J Eur Acad Dermatol Venereol 2014;28:72-9.

14. Park KY, Kim HK, Kim BJ, Kim MN. Letter: Platelet-rich plasma for treating male pattern baldness. Dermatol Surg 2012;38:2042-4.

15. Lopez V, Vaya A, Bautista D, Ricart JM. Autologous platelet-rich plasma as a potential therapeutic tool in androgenetic alopecia. J Am Acad Dermatol 2013;68:SAB103.

16. Anitua E, Andia I, Ardanaz B, Nurden P, Nurden AT. A randomized, placebo-controlled trial of 1% topical minoxidil solution in the treatment of androgenetic alopecia in Japanese women. Eur J Dermatol 2007;17:37-44.