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EVALUATING THE EFFECTIVENESS OF PRP MICRONEEDLING ON ANDROGENETIC ALOPECIA

Areeba Batool[1], Fiza Rafique[2], Ayesha Afzal[3], Muskan Zainab[*4]

[1,2,3,*4]*Faculty of Allied Health Sciences Superior University Lahore*

[*1]su91-baacm-f22-097@superior.edu.pk,[2]su91-baacm-f22-003@superior.edu.pk,[3]su91-baacm-f22-020@superior.edu.pk , [*4]muskan.zainab@superior.edu.pk

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Androgenetic alopecia, platelet-rich plasma, microneedling, hair density, trichoscopy.

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Corresponding Author: *
Muskan Zainab

Abstract

Background:
Androgenetic alopecia is a progressive form of patterned hair loss, which usually affects the thickness, density and other aesthetic qualities of scalp hair.Platelet-rich plasma combined with microneedling is one of the non-surgical options that have received interest as a non-invasive treatment that can be used to improve scalp hair qualities and stimulate observable hair growth.

Objective:
To assess the change in hair thickness in participants that were treated with PRP in combination with microneedling based on objective trichoscopic measurements at baseline and after 4 months..

Methodology:
There was a prospective, interventional single-arm study done on 36 individuals with androgenetic alopecia during a period of 4 months. Follow-up and baseline assessment was made using trichoscopy and standardized scalp photography. The outcome measured was primarily that of hair thickness and other data was measured on hair density, hair count, global photographic evaluation, patient satisfaction, and adverse effects. The SPSS version 26 was used to perform statistical analysis. At baseline and week-16, the Wilcoxon signed-rank was used to compare, whereas the Friedman was used to compare repeated follow-up assessments. The p-value of less than 0.05 was considered to be statistically significant.

Results:
The results of the study revealed that there was a significant improvement in the hair thickness between baseline and the end follow-up. There were improvements in the hair density, hair count, overall assessment, and patient satisfaction over time. Side effects such as discomfort, erythema, edema and pruritus were reported; these were slight and expected with no major adverse events reported.

Conclusion:
PRP and microneedling combination was effective in androgenetic alopecia during the follow- up. The intervention was shown to be a successful non-invasive procedure that can be used to increase hair density and other related clinical outcomes in individuals seeking non-surgical hair restoration procedure.

INTRODUCTION

Androgenetic alopecia is a gradually evolving pattern of hair thinning that affects a large proportion of the adult population and carries visible consequences that extend beyond physical appearance. The progressive reduction in hair density, alteration in hair shaft calibre, and receding hairlines are not merely cosmetic concerns but often influence confidence, social interaction, and overall quality of life. Over time, affected individuals may experience increasing psychological distress, including reduced self-esteem and heightened concern about aging or social perception, which further emphasizes the broader impact of this condition. The chronic and slowly advancing nature of this disorder makes it particularly challenging to manage, as the underlying follicular changes continue even in the absence of visible progression in early stages. Patients commonly seek interventions that can restore hair growth rather than only delay further loss, reflecting a preference for treatments that offer both functional and aesthetic improvement (1).

In clinical practice, there is a consistent demand for approaches that provide noticeable improvement while maintaining safety and tolerability over extended periods, particularly because long-term management is often required. This shift toward more individualized and outcome-focused care highlights the importance of exploring therapeutic strategies that can actively influence follicular regeneration and improve overall scalp health (1)(2).

Traditional management has relied largely on pharmacological options aimed at modifying the underlying hormonal influences or prolonging the active growth phase of hair follicles. These treatments are designed to interfere with androgen-mediated follicular miniaturization or to enhance hair cycle dynamics, thereby slowing disease progression. Although widely prescribed, their effectiveness is not uniform across all individuals, and variability in response remains a persistent challenge. Long-term adherence is typically necessary to sustain benefits, yet many patients discontinue therapy due to slow onset of action or dissatisfaction with the degree of improvement achieved. In addition, certain individuals may experience minimal visible changes despite consistent use, which can affect confidence in treatment outcomes (2).

The reliance on continuous therapy also raises concerns regarding practicality and long-term commitment, particularly in younger populations. These limitations have led to increased interest in alternative approaches that can provide more direct stimulation of follicular activity. The focus has gradually shifted toward regenerative strategies that aim to improve the biological environment of the scalp, thereby supporting natural hair growth mechanisms rather than relying exclusively on pharmacological modulation .(2)

Platelet-rich plasma has emerged as a promising modality within this evolving therapeutic landscape due to its autologous origin and biological activity. Prepared from the patient's own blood, it contains a concentrated pool of platelets enriched with growth factors that play a crucial role in tissue repair and cellular signalling. These growth factors are involved in processes such as angiogenesis, extracellular matrix formation, and cellular proliferation, all of which are relevant to hair follicle function. When administered into the scalp, platelet-rich plasma is believed to activate follicular stem cells and enhance the surrounding microenvironment, creating conditions that favor hair regeneration (2)(3).

The ability to utilize intrinsic biological mechanisms without introducing foreign substances makes this approach particularly appealing in clinical settings. Moreover, its minimally invasive nature and relatively favorable safety profile contribute to its increasing acceptance among both clinicians and patients. This integration of biological stimulation with procedural simplicity aligns with broader trends in regenerative medicine, where the goal is to enhance the body's natural capacity for repair and restoration (3).

Methodology:

There was a prospective, interventional single-arm study done on 36 individuals with androgenetic alopecia during a period of 4 months. Follow-up

and baseline assessment was made using trichoscopy and standardized scalp photography. The outcome measured was primarily that of hair thickness and other data was measured on hair density, hair count, global photographic evaluation, patient satisfaction, and adverse effects. The SPSS version 26 was used to perform statistical analysis. At baseline and week-16, the Wilcoxon signed-rank was used to compare, whereas the Friedman was used to compare repeated follow-up assessments. The p-value of less than 0.05 was considered to be statistically significant.

RESULTS

Table 1: Participant Age

The participants' mean age was 30.28 ± 8.41 years, indicating that most participants were young adults. The minimum age of the participants was 19 years, while the maximum age recorded was 55 years.

Participant Age	
Mean	30.28
Std. Deviation	8.41
Minimum	19
Maximum	55

Table 2: Participant Gender

Out of 36 participants, 26 (72.2%) were female, while only 10 participant (27.8%) was male. This shows that the study population was predominantly female.

Participant Gender		
	Frequency	**Percent**
Male	10	27.8
Female	26	72.2
Total	36	100.0

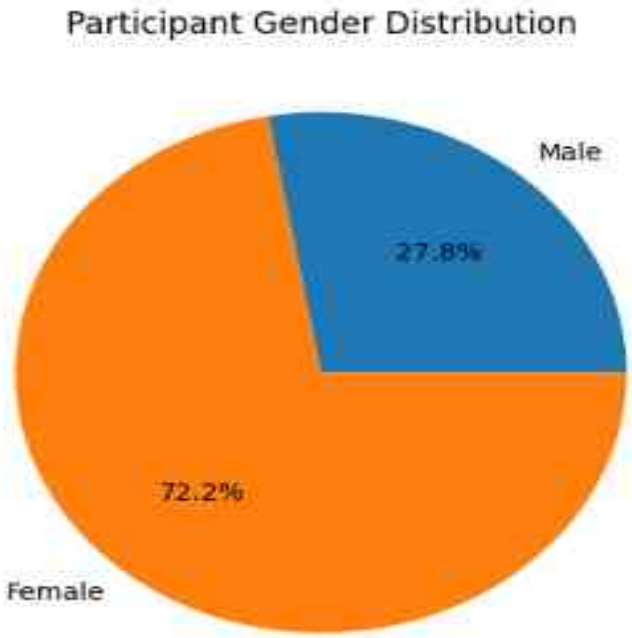

Figure 2. Pie Chart of Participant Gender.

The chart shows that female participants made up the largest part of the study, accounting for 72.2% of the total participants. Male participants represented 27.8%, showing that there were very few males in the study.

Table 3: Change in Hair Thickness During Follow up

Table shows the change in hair thickness between week 16 and baseline. The mean hair thickness showed an overall upward pattern over the follow-up although there were minor variations in between visits.The Friedman test was found to be statistically significant in the variation in hair thickness during the repeated follow-up visits, indicating that there was a significant change in hair thickness with time.

Time point	Mean ± SD
Baseline	56.11 ± 14.20
Week 4	61.27 ± 14.82
Week 8	61.71 ± 14.04
Week 12	60.98 ± 13.97
Week 16	62.30 ± 14.87

Figure 3. line Chart of Mean Hair Thickness from Baseline and Follow up

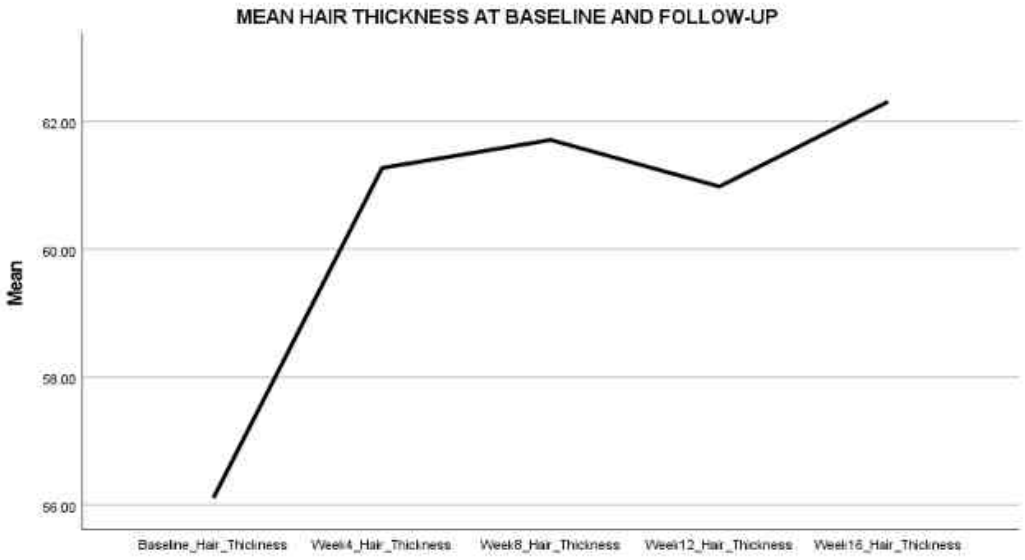

Figure 3. Mean Hair Density from Baseline and Follow Up

Table shows the change in hair density over time of treatment. Mean hair density indicated that there was an overall increase in baseline to week 16 and improvement was observed in follow-up visits. The difference between the overall follow-up visits was statistically significant.

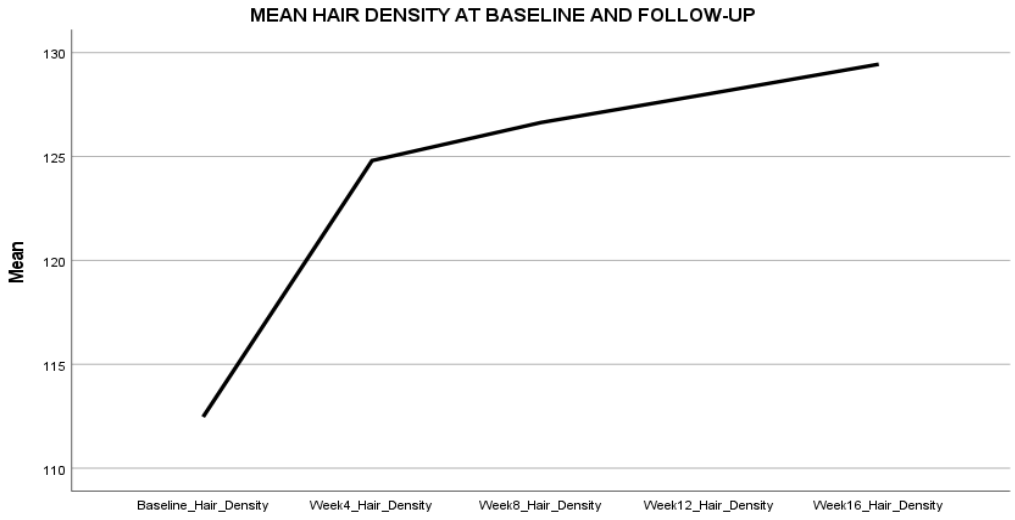

Figure 4. Line Chart For Mean Hair Count and Follow Up

Table 4: Change in Hair count During Follow up

Table shows the change in the number of hairs during the follow-up. The mean number of hair increased after the treatment and maintained the levels above the initial level during the follow-up period. The identified change was statistically significant.

Time point	Mean ± SD
Baseline	88.56 ± 18.04
Week 4	97.75 ± 22.50
Week 8	99.61 ± 21.86
Week 12	104.19 ± 18.21
Week 16	103.36 ± 18.52

Overall p-value calculated using Friedman test.

Figure shows the trend in the average number of hair during the follow-up period. There was a considerable improvement after the treatment and the high levels were maintained until week 16.

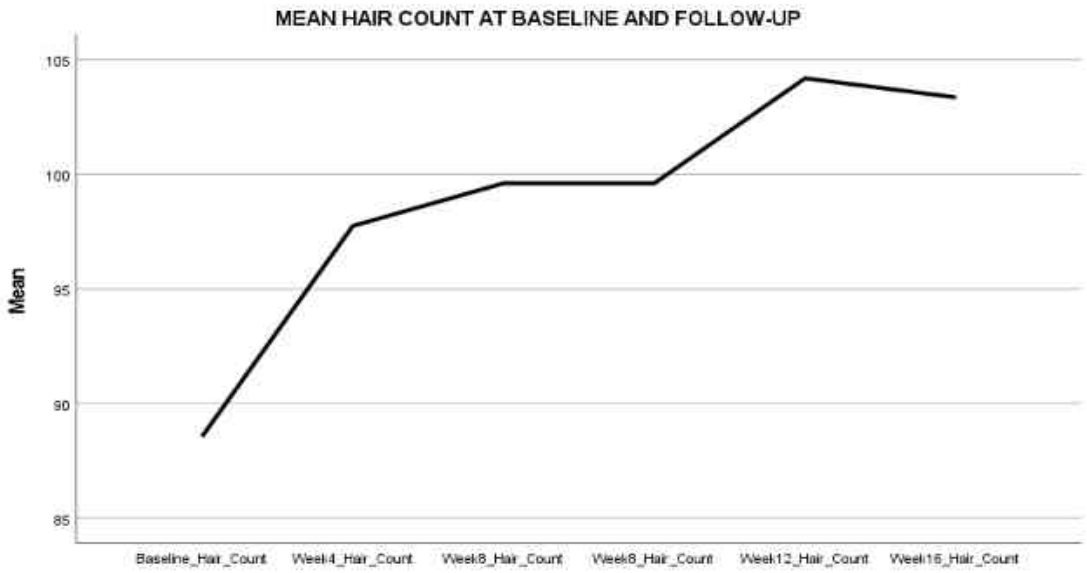

Table 5: Change in Global Assesment During Follow up

Table shows the scores of global evaluation recorded during the follow-up period. The average global assessment score was found to have improved at the end of the treatment period with the highest average value being observed at week 12 rather than at the end of the treatment.

Time point	Mean ± SD
Baseline	0.00 ± 0.00
Week 4	1.83 ± 1.38

Time point	Mean ± SD
Week 8	2.53 ± 1.11
Week 12	3.56 ± 0.61
Week 16	2.97 ± 0.77

Overall p value is calculated using Friedman test.

Table 6: Change in Patient Satisfaction during Follow up

Table shows the level of patient satisfaction at baseline and the follow-up period. Significant enhancement in satisfaction was observed after treatment and overall change in visit-to-visit was statistically significant.

Table 10: Patient satisfaction at baseline and follow-up visits

Time point	Mean ± SD
Baseline	1.39 ± 0.49
Week 4	2.61 ± 0.55
Week 8	3.50 ± 0.51
Week 12	3.53 ± 0.65
Week 16	4.56 ± 0.50

Overall p-value calculated using Friedman test.

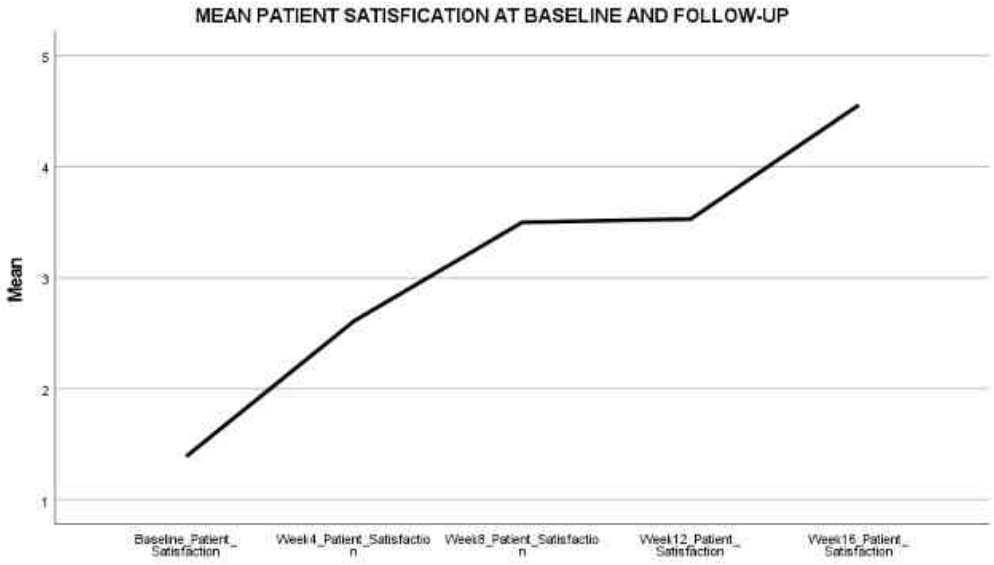

Figure 6. Line Chart of Patient Satisfaction During Follow up?

Chart shows that the level of patient satisfaction is increasing after the baseline but the rate is slower in week 16. The highest mean score of satisfaction was observed during the last visit

Table 7: Frequency Distribution of Adverse Effects

The frequency distribution of side events that are recorded in therapy is shown in Table 12. There was pain, edema, erythema and pruritus with varying degrees in the participants. The research sample also did not report any other adverse events.

Table 12: Frequency distribution of adverse effects

Adverse effect	Yes n (%)	No n (%)
Pain	23 (63.9%)	13 (36.1%)
Redness	18 (50.0%)	18 (50.0%)
Swelling	21 (58.3%)	15 (41.7%)
Itching	17 (47.2%)	19 (52.8%)
Other adverse event	0 (0.0%)	36 (100.0%)

DISCUSSION

Androgenetic alopecia remains among the most perplexing conditions in cosmetic and dermatologic treatment as patients never seek treatment to reduce the amount of hair loss only. The actual anticipation is usually noticeable improvement of hair quality, increased scalp coverage and a noticeable change in appearance. Here, the results reported below justify the effectiveness of PRP in conjunction with microneedling as a non-invasive method of treatment. The improvement was observed not only in hair thickness (the major endpoint) but also in hair density, the number of hairs, the overall evaluation, and patient satisfaction during the period of follow-up. When a series of results move in a positive direction the reaction appears to be relatively more important than an alteration observed in one measure. This increases the overall outcome therapeutic value and denotes that the intervention influenced the scalp in a more comprehensive and advantageous way (24).

Especially important is the increase in hair density, which occurs because the shrinkage of shaft diameter is one of the most obvious signs of follicular shrinkage in androgenetic alopecia. Before the loss of a lot of hair, as hair follicles become thinner, the scalp becomes more exposed and the aesthetic effect is enhanced. This means that any change in thickness matters; it is an indication of an aspect that patients will most probably experience in their day to day lives. The identified increase observed in the consecutive follow-up visits suggests that the follicles responded in such a way that improved the quality of structures of the new hair. This tendency is consistent with the past studies which suggested that PRP-based therapy is associated with the better shaft characteristics and the observable improvement in scalp appearance. The pattern identified supports the more general therapeutic approach that regenerative scalp procedures can alleviate some of the visual effects of follicular atrophy (31).

The density of the hair also improved during the follow-up thereby strengthening both the relevance of the initial observation as opposed to having to repeat the same one. A bigger hair shaft diameter could be more attractive, but the superior density suggests a greater scalp response, meaning that the effect of the treatment was not limited to a limited amount of hairs that had already been visible. Past research using PRP in androgenetic alopecia has often placed great focus on density as a major predictor of effectiveness particularly where treatment is performed in a series of sessions. This witnessed a similar overarching trend whereby density increased gradually with time. Clinically, this is important because a higher density will better lead to a poorer scalp view and better overall coverage, which are chief concerns among individuals seeking patterned hair loss treatment (3).

This interpretation is further supported by the number of hair which increases. As the thickness, density and quantity improve at the same time, the probability of an incidental or superficial response decreases in plausibility. The trend shows that the treatment had more binding effects to the scalp. Previous clinical trials on PRP, with or without other treatments, have shown similar improvements on measurable hair parameters with repetitive treatments. The response that is captured in this case is in line with the general trend. It also supports the idea that beneficial changes in androgenetic alopecia would be best measured through a combination of interrelated outcomes and not isolated measure (9).

One of the most important aspects of these results is the use of PRP in combination with microneedling. Such a mix is worth consideration since microneedling is not just an auxiliary procedure. The controlled micro-injury can be induced, stimulating local healing, and vascular reactions, as well as creating a more regenerative-friendly environment on the scalp. The beneficial effect seen could be considered the interaction of platelet-derived growth factors and controlled dermal stimulation. Comparison studies conducted in the past, have often reported that combination therapy has a more favorable result in comparison to single modality treatment. This trend in this thesis follows the same line of treatment. The improvement in a number of objective and clinical outcomes suggests that the integrated approach could have the practical value of patients who prefer a more active non-surgical approach (14).

This conclusion is believable when viewed in combination with previous studies which have investigated PRP-based combinations in patterned hair loss. Comparative studies on PRP alone and PRP with microneedling have shown that the response with the combination of the two is better. Also, studies comparing microneedling vs. microneedling + PRP have also indicated more beneficial results in the case of the inclusion of the platelet component. This reasoning is also here presented. The response involved a variety of domains, which led to measurable changes in the scalp parameters, improvement in visual evaluation, and satisfaction. This trend implies that the combined method might have a more extensive therapeutic effect than any of the components will have on its own (32).

An international assessment resulted in significant improvement, which has a true clinical relevance. Trichoscopic measurements are not the only

elements of success in androgenetic alopecia. It is also essential that the visual improvement of the scalp on examination and the possibility of its manifestation in everyday life are seen. Higher quality and analysis around the world suggests that the changes were not only hidden within the technical indices, but also relevant on the clinical front. This is especially important aesthetically, as the noticeable improvement often impacts the trust that the patient has in the treatment. These results are not isolated since there has been a great deal of agreement that successful scalp therapy should produce quantifiable and observable changes (8).

The patient satisfaction was also on a similarly positive trend and it is possible that this may be one of the greatest practical implications of the thesis. Androgenetic alopecia does not only affect the scalp but also affects self-image, self-care habits and self-confidence in social settings. Accordingly, the perception of the patients cannot be considered as an insignificant final destination. A therapy, which results in statistical improvement but does not convince the patient, might have limited practical value. The fact that the degree of satisfaction increased evidently during the follow-up points to the fact that the benefit was substantial enough to make a difference among beneficiaries of the treatment. Past studies on regenerative and procedural hair treatment have continued to assert that the perceived benefits and the readiness to continue treatment are the key to the success of any non-surgical treatment. The pattern that is being observed supports the latter view and empowers the objective findings with an empirical meaning (4).

These observations explain the role of PRP in combination with microneedling in the continuum of non-surgical treatments of androgenetic alopecia. In modern management, the pharmacological treatment, device-oriented alternatives, and procedural therapies have their place, and each of them occupies a separate niche in the patient care. This hybrid approach is useful because it offers a procedural approach that aims at more effectively improving the scalp hair without using surgical regeneration. The latter option can be of particular use to individuals who are interested in more noticeable changes than what the regular maintenance procedures can provide. The identified improvement in objective scalp measurements, general aesthetics and patient satisfaction supports its clinical importance in hair restoration therapy (30)

PRP and microneedling of androgenetic alopecia were positively responded to. The thickness of hair, its density, number, general assessment, and satisfaction of the patient showed improvement in follow-up, but adverse events described were relatively small and expected. This tendency conforms to the earlier research which has already proven the benefits of PRP-based therapy, especially when microneedling is a part of the treatment plan. PRP in combination with microneedling can, therefore, be deemed as a promising non-surgical method in the management of androgenetic alopecia (35).

Limitations

- There was a small number of participants in the study, and thus, the findings cannot be applied to the whole population of patients with androgenetic alopecia.
- The follow-up time was also limited to 16 weeks thus excluding the long-term improvement evaluation.
- There was no control or comparison group.
- The single treatment method used preclined the independent evaluation of the impacts of PRP and microneedling.
- This could have been influenced by differences in the severity of the first instance and individual responses to treatment.

Recommendations

- The efficacy of PRP in combination with microneedling in androgenetic alopecia needs to be assessed further with larger trials.
- The investigations need to extend into the future to include a longer follow-up time to evaluate the effectiveness of the therapy.
- It should be compared with PRP alone, microneedling alone, and the traditional non-surgical therapy.

- There should be standardized guidelines regarding the PRP preparation, treatment courses, and microneedling depth.
- PRP with microneedling can be considered a suitable option in certain patients that would like to find a less invasive and non-surgical option of visible improvement of scalp hair.

CONCLUSION

This study has shown that PRP combined with microneedling had an association with a favourable outcome of androgenetic alopecia during follow-up. The main conclusion was the increase of the hair thickness at the end of the evaluation compared to the baseline which directly served the main aim of the study. The thickness observed is a good indication of a considerable improvement on the treated region, because one of the key features of androgenetic alopecia is the thinning of the hair shaft

Cases
Figure 1.1

Figure 1.1 shows 1st month vs after 4 months male frontal scalp

Figure 1.2

Figure 1.2 shows Before/After female parting improvement

Figure 1.3

Figure 1.3 : Before/After female scalp improvement.

Figure 1.4

Figure 1.4 shows Before/After black hair top view

REFERENCES

Abdin R, Zhang AL, Jimenez F. Treatment of androgenetic alopecia using PRP: an in-depth analysis of 17 clinical trials. J Dermatolog Treat. 2022. PMID: 35372424.

Abid A, Fazal F, Mumtaz H, Azam Raja H, Malik BH. Comparison of the efficacy of platelet-rich plasma with topical minoxidil in treating patients with androgenetic alopecia: a systematic review of clinical trials. Skin Health Dis. 2025;5(5):311–318. doi:10.1093/skinhd/vzaf040.

Devjani S, Ezemma O, Kelley KJ, Stratton E, Senna M. Androgenetic Alopecia: Therapy Update. Drugs. 2023 Jun;83(8):701-715. doi: 10.1007/s40265-023-01880-x. Epub 2023 May 11. PMID: 37166619; PMCID: PMC10173235.

Biben JA. Local injection versus topical microneedling of platelet-rich plasma for androgenetic alopecia: systematic review. J Cosmetic Dermatol. 2025. PMID: 40083615.

Kaiser MA, Ferrari LM, Gaumond SI, Issa N, Jimenez JJ, Issa NT. Platelet Rich Plasma Combination Therapies for Treatment of Androgenetic Alopecia: A Systematic Review. J Cutan Aesthet Surg. 2023 Jul-Sep;16(3):169-177. doi: 10.4103/JCAS.JCAS_206_22. PMID: 38189076; PMCID: PMC10768946.

Yesmeen M, Haque F. Comparative efficacy of minoxidil, dermaroller, and PRP treatments in androgenetic alopecia (AGA): a clinical study. Saudi J Med Pharm Sci. 2024 Aug 28;10(8):doi: 10.36348/sjmps.2024.v10i08.016

Borowiecka, J.M.; Dalewski, B.; Pałka, Ł. Effectiveness of Platelet-Rich Plasma in the Treatment of Androgenic Alopecia Compared to Placebo and Topical Minoxidil: A Systematic Review. Sci. Pharm. 2023, 91, 4. https://doi.org/10.3390/scipharm91010004

Leonik S, Smoczok M, Bergler-Czop B. Evaluation of the efficacy of microneedling without and with minoxidil 5% and autologous platelet-rich plasma for androgenetic alopecia in men. Adv Dermatol Allergol. 2024 Oct;41(5):505-514. doi: 10.5114/ada.2024.143496.

Evans AG, Mwangi JM, Pope RW, Ivanic MG, Botros MA, Glassman GE, et al. Platelet-rich plasma as a therapy for androgenic alopecia: a systematic review and meta-analysis. J Dermatolog Treat. 2022 Feb;33(1):498-511. doi: 10.1080/09546634.2020.1770171.

Garg S, Bansal A. Platelet-rich plasma in interventional dermatology and trichology: how far have we come? Cosmoderma. 2021 Jun 10;1:12. doi: 10.25259/CSDM_7_2021..

Sun Y, Lu M, Gao X, Liu Y, Ren J, Wang Y, et al. Who tells the story of the treatment of androgenetic alopecia? J Cosmet Dermatol. 2025;24:e70370. doi: 10.1111/jocd.70370.

Ruthvik S, John RS, George M, Kumar SP, Krishnan M. Comparison of efficacy of platelet-rich plasma with and without topical minoxidil for hair growth in patients with androgenetic alopecia: a prospective study. Cureus. 2024;16(2):e53875. doi:10.7759/cureus.53875.

Gentile P, Garcovich S. Systematic review of platelet-rich plasma use in androgenetic alopecia compared with Minoxidil®, Finasteride®, and adult stem cell-based therapy. Int J Mol Sci. 2020 Apr 13;21(8):2702. doi: 10.3390/ijms21082702.

Marques MF, Simão AJM, Bellizia AL, Oliveira NSD, Labriola ICS, The efficacy of using plateletrich plasma (PRP) in the treatment of androgenic alopecia: a literature review, Journal of Drug Delivery and Therapeutics. 2024; 14(5):185-190 DOI: http://dx.doi.org/10.22270/jddt.v14i5.6598

Gressenberger P, Pregartner G, Gary T, Wolf P, Kopera D. Platelet-rich plasma for androgenetic alopecia treatment: a randomized placebo-controlled pilot study. Acta Derm Venereol. 2020;100:adv00247. doi:10.2340/00015555-3609.

Khan A, Agarwal D, Talwar A. Comparison of microneedling with platelet rich plasma vs minoxidil (5%)+finasteride (0.1%) topical therapy in androgenetic alopecia: a randomised clinical study. J Clin Diagn Res. 2023 Mar;17(3):WC01-WC05. doi: 10.7860/JCDR/2023/62102.17569.

Hausauer AK, Jones DH. Evaluating the efficacy of different platelet-rich plasma regimens for management of androgenetic alopecia: a single-center, blinded, randomized clinical trial. Dermatol Surg. 2020;44(9):1191–1200. doi:10.1097/DSS.0000000000001567.

Jaiswal S, Jawade S. Microneedling in dermatology: a comprehensive review of applications, techniques, and outcomes. Cureus. 2024 Sep 23;16(9):e70033. doi: 10.7759/cureus.70033.

Shah KB, Shah AN, Solanki RB, Raval RC. A comparative study of microneedling with platelet-rich plasma plus topical minoxidil (5%) and topical minoxidil (5%) alone in androgenetic alopecia. Int J Trichology. 2020 Jan-Mar;9(1):14-18. doi: 10.4103/ijt.ijt_75_16.

Kaiser M, et al. Treatment of androgenetic alopecia: current guidance and emerging treatment options. Skin Health Dis. 2023;3:e2023. doi:10.1002/shd2.2023.

Khoso H, Fahim M. Comparison of platelet-rich plasma therapy alone with platelet-rich plasma plus daily topical 5% Procapil for androgenetic alopecia: a quasi-experimental clinical trial. J Ayub Med Coll Abbottabad. 2024;36(2):299–304. doi:10.55519/JAMC-02-12749.

Khoso H, Fahim M, Bakhtiar R. Is the addition of oral biotin to PRP more beneficial for treating male pattern hair loss compared to PRP alone? A randomized controlled trial. J Pak Assoc Dermatol. 2025;35(1):199–205.

Lolli F, Pallotti F, Rossi A, Fortuna MC, Caro G, Lenzi A, et al. Androgenetic alopecia: a review. Endocrine. 2023 Jul;57(1):9-17. doi: 10.1007/s12020-017-1280-y.

Lopes-Silva R, Santos M, Sequeira ML, Silva A, Antunes T, Valejo-Coelho P, et al. Platelet-rich plasma effectiveness in treating androgenetic alopecia: a comprehensive evaluation. Cureus. 2025 Jan 13;17(1):e77371. doi: 10.7759/cureus.77371.

Chen S, Li L, Ding W, Zhu Y, Zhou N. Androgenetic Alopecia: An Update on Pathogenesis and Pharmacological Treatment. Drug Des Devel Ther. 2025 Aug 25;19:7349-7363. doi: 10.2147/DDDT.S542000. PMID: 40873858; PMCID: PMC12380480.

Chawla S, Sacchidanand S, Leelavathi B. Split face comparative study of microneedling with PRP versus microneedling with Vitamin C in treating atrophic post acne scars. J Cutan Aesthet Surg. 2020 Oct-Dec;7(4):209-212. doi: 10.4103/0974-2077.150742.

Bansal S, Gupta SB, Gupta A, Raman A, Goyal J. Comparative study of platelet rich plasma therapy versus microneedling as a treatment modality for androgenetic alopecia. IP Indian J Clin Exp Dermatol. 2025;11(2):194-201.

Stevens J, Khetarpal S. Platelet-rich plasma for androgenetic alopecia: a review of the literature and proposed treatment protocol. Int J Womens Dermatol. 2022;5(1):46–51. PMCID: PMC6374694.

Yepuri V, Venkataram M. Platelet-rich plasma with microneedling in androgenetic alopecia: efficacy and number of sessions required. Dermatol Ther. 2021;34(1):e14653. PMID: 34566361.

Samin KA, Hassan L, Waseem S, Bukhari SK, Afzal U, Khan S, et al. Platelet rich plasma in androgenetic alopecia: a critical analysis of current treatment modalities. J Pak Assoc Dermatol. 2024 Oct-Dec;34(4):1022-1029.

Singhal P, Agarwal S, Dhot PS, Sayal SK. Efficacy of platelet-rich plasma in treatment of androgenic alopecia. Asian J Transfus Sci. 2020 Jul-Dec;9(2):159-62. doi: 10.4103/0973-6247.162713. PMID: 26420936; PMCID: PMC4562137.

Aggarwal K, Gupta S, Jangra RS, Mahendra A, Yadav A, Sharma A. Dermoscopic assessment of microneedling alone versus microneedling with platelet-rich plasma in cases of male pattern alopecia: a split-head comparative study. Int J Trichology. 2020 Jul-Aug;12(4):156-163. doi: 10.4103/ijt.ijt_71_20.

Pillai JK, Mysore V. Role of Low-Level Light Therapy (LLLT) in Androgenetic Alopecia. J Cutan Aesthet Surg. 2021 Oct-Dec;14(4):385-391. doi: 10.4103/JCAS.JCAS_218_20. PMID: 35283601; PMCID: PMC8906269

Nilforoushzadeh MA, Roohaninasab M, Behrangi E, Jafarzadeh A, Nouri M, Zare S, Zare S. Phase I Clinical Trial: Evaluating the Efficacy, Safety, and Patient Satisfaction of Platelet-Rich Plasma (PRP) Injections and Microneedling for Androgenetic Alopecia Treatment. J Cosmet Dermatol. 2025 Sep;24(9):e70408. doi: 10.1111/jocd.70408. PMID: 40960112; PMCID: PMC12442246.

Muhammad A, Iftikhar N, Mashhood A, Saleem Z, Sundus M, Khalid AA, Khan S, Naveed S, Shahid W, Ajmal U, Akbar A. Comparison of Efficacy of Platelet-Rich Plasma (PRP) With PRP Microneedling in Androgenetic Alopecia. Cureus. 2022 Oct 18;14(10):e30418. doi: 10.7759/cureus.30418. PMID: 36407242; PMCID: PMC9670661.

Rinaldi S, Bussa M, Mascaro A. Update on the treatment of androgenetic alopecia. Eur Rev Med Pharmacol Sci. 2021 Jan;20(1):54-58.

Asilian A, Farmani A, Saber M. Clinical efficacy and safety of low-dose oral minoxidil versus topical solution in the improvement of androgenetic alopecia: A randomized controlled trial. J Cosmet Dermatol. 2024; 23: 949-957. doi:10.1111/jocd.16086

Egger A, Resnik SR, Aickara D, Maranda E, Kaiser M, Wikramanayake TC, Jimenez JJ. Examining the Safety and Efficacy of Low-Level Laser Therapy for Male and Female Pattern Hair Loss: A Review of the Literature. Skin Appendage Disord. 2020 Sep;6(5):259-267. doi: 10.1159/000509001. Epub 2020 Jul 7. PMID: 33088809; PMCID: PMC7548873.

Nguyen LV, Nguyen TTT. Effectiveness of Autologous Platelet-Rich Plasma for Androgenetic Alopecia: A Double-Center, Non-Controlled, Randomized Clinical Study in Vietnam. Clin Cosmet Investig Dermatol. 2025 Jul 2;18:1645-1656. doi: 10.2147/CCID.S528663. PMID: 40620897; PMCID: PMC12229160.

Jimenez-Cauhe J, Saceda-Corralo D, Rodrigues-Barata R .Effectiveness and safety of low-dose oral minoxidil in male androgenetic alopecia.Journal of the American Academy of Dermatology, 2020; 81, 648-649