The Role of 5% Minoxidil *versus* Platelet-Rich Plasma in Treatment of Alopecia Areata

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ABSTRACT

Objective: To compare the efficacy of topical minoxidil and platelet-rich plasma (PRP) in the treatment of alopecia areata (AA).

Study Design: Randomised control trial.

Place and Duration of the Study: Department of Dermatology, Jinnah Postgraduate Medical Centre, Karachi, Pakistan, from December 2021 to June 2022.

Methodology: The study included all the patients who visited JPMC Karachi during the study period. Permission from the ERB was obtained. The inclusion criteria were any gender and age 10 to 45 years. Topical minoxidil 5% solution was applied twice daily to Group A (six pubs/time), while PRP injections were administered to Group B at baseline and every four weeks for three months. Serial photos and the severity of alopecia tool (SALT) were used to determine the clinical assessment. When comparing the effectiveness between the two groups, a p-value of <0.05 was considered significant. SPSS version 23 was used to analyse the data.

Results: Mean age was 23.11 ± 8.9 years in 376 patients. PRP and Minoxidil groups had mean SALT scores at three months that were 1.48 and 1.54, respectively. Both treatments were shown to be efficacious. There was no statistically significant difference in efficacy between the minoxidil solution and PRP (p = 0.483).

Conclusion: There is no apparent difference between PRP and topical minoxidil 5% solution in the management of AA. To verify the results, additional studies are needed with a larger sample size and a longer duration of follow-up.

Key Words: *Minoxidil, Platelet-rich plasma, Alopecia areata, Severity of alopecia tool score.*

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INTRODUCTION

Alopecia areata (AA), an auto-immune condition, can affect any area that bears hair.[1] According to the most recent data obtained globally, AA affects 1 in 1,000 people and has a 2% incidence.[2] The classification includes diffuse, mono-locularis, universalis, ophiasis, and totalis based on the extent of the condition.[3] AA is caused by T-cells that target the hair follicles, and are influenced by both inherited and environmental factors.[4,5] A lymphocytic infiltration (bee swarm) is visible in the lower third and peribulbar region of the follicle on histopathology.[6] There is no effective treatment available, despite a variety of techniques.[7,8] The usefulness of PRP in improving diameter or terminal hair density has been demonstrated in numerous studies.[9] For three decades, minoxidil has also been used as a treatment option for AA.[10]

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The clinical relevance of these two therapies is still up for debate because there are not enough studies comparing minoxidil and PRP head-to-head on a national and worldwide scale. This study aimed to compare the efficacy of both modalities in treating AA to see if there is a statistically significant difference between them and if they are efficacious. The rationale was to gather local data and develop new approaches to improve patient outcomes by using the more efficient treatment option as the first-line of treatment in the future.

METHODOLOGY

From December 2021 to June 2022, patients visiting the Dermatology OPD at the Jinnah Postgraduate Medical Centre in Karachi, Pakistan, were recruited for the study after obtaining permission from the Ethical Review Board. Non-probability consecutive sampling was used. Demographic data, disease, and family history were taken after receiving written consent. The sample size was calculated by the WHO sample size calculator using minoxidil *vs.* PRP as (81% *vs.* 70%). Power of test (1-β) = 80%, level of significance (α) = 50%, and the estimated sample size was n = 188, in each group.

The patients were randomly divided into two groups using computer-generated sequential numbers placed in sealed envelopes and opened only before the commencement of the study. The study was conducted in a single-blind fashion, with 188 patients in each of the two groups. Inclusion criteria

comprised either gender, age between 10 and 45 years, and patients who gave written consent. The duration of the patients' patchy AA was less than, equal to, or greater than three months. Pregnant or nursing women, immunocompromised patients, patients who had received any therapy in the previous three months and patients with active scalp inflammation were all excluded from the study.

Groups A and B were created for the patients. Topical minoxidil 5% solution was administered two times per day to Group A (six pubs/time) and PRP injections were administered to Group B every four weeks. Three injections were given to each patient in Group B: The first session at baseline, the second session at four weeks, and the third session at eight weeks. Baseline labs were conducted, including random blood sugar, full blood count, renal and liver function tests, HIV, viral markers, activated partial thromboplastin time, and prothrombin time.

Each patient had 10mL of venous blood collected by researchers for the extraction of PRP, which was divided into two test tubes containing 5mL. After being centrifuged for 10 minutes at 3,000 rpm with the blood in the test tubes, the blood was separated into two parts: A superior plasma supernatant phase and a red inferior phase. The PRP portion was taken out and put in a tube containing calcium gluconate. About 4mL of total PRP was collected, and under aseptic measures, injections of PRP were administered. PRP was injected 0.1ml at a 45° angle, 10mm apart from the lesion, into the dermis and subcutaneous tissue with the help of 1ml (U100) insulin syringe. The researcher carried out the entire process.

The severity of alopecia tool (SALT)[11] was used to evaluate the extent of hair loss at baseline and after a 3-month treatment period. The AA patch's size was not measured. Each of the therapy was continued for a total of 12 weeks. The final result was obtained after the 3-month therapy period was over.

The data were analysed with SPSS version 23, a statistical software for social science. Age, and SALT scores (at baseline and three months after treatment) were calculated as the mean SD. Gender and site of patchy alopecia (vertex, occipital, temporal, or combination) frequencies and percentages were assessed. Disease duration was counted as ≤3 months and >3 months. Efficacy of both treatments was evaluated using p-value (for each treatment group, a paired sample t-test was used to determine improvement in SALT score) and 95% confidence interval. The effectiveness of the two groups was compared, with a p-value of <0.05, considered significant.

RESULTS

In this randomised control trial, a total of 376 patients (188 in each group) were treated with minoxidil and PRP to compare the efficacy of these two treatments in AA. The mean of age was 23.11 ± 8.9 years. Frequencies and percentages of age, gender, and duration of disease are shown in Table I.

Group-wise distribution of the site of patchy alopecia showed that 66 (35.10%) and 46 (24.46%) patients had hair fall on vertex site, 53 (28.20%) and 68 (36.18%) had the occipital site, 32 (17.02%) and 50 (26.60%) had the temporal site, while 37 (19.68%) and 24 (12.76%) had a combination and were enrolled in the minoxidil and PRP group, respectively.

Both PRP and minoxidil were shown to be efficacious (p <0.001, CI. 3.24521 - 3.92500; and p <0.001, CI. 2.37662 - 2.82551, respectively), as shown in Figure 1; however, nine patients in the minoxidil group and four patients in the PRP group had no improvement in the SALT score. Mean of the SALT score at baseline and outcome in minoxidil and PRP is shown in Figure 1. There was no statistically significant difference between the SALT scores at the final review of both groups (p = 0.483, CI 0.020253 - 0.09615) as shown in Figure 2, but treatment response was better in PRP group (Group B) than minoxidil group (Group A).

No side effect was noted in the PRP group except pain at the site of injection, while three patients developed pruritus and two developed irritant contact dermatitis in the minoxidil group.

Table I: Characteristics of 376 patients with alopecia areata.

	Minoxidil	PRP
Gender, n (%)		
Male	90 (47.88)	85 (45.22)
Female	98 (52.12)	103 (54.78)
Age, n (%)		
10-30	111 (59)	108 (57)
>30	77 (41)	80 (43)
Duration of disease, n (%)		
<3 months	116 (61.7)	111 (59)
>3 months	72 (38.3)	77 (41)

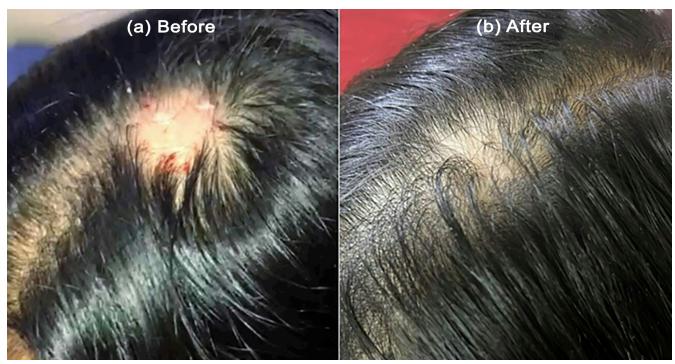

Figure 1: (a) A patient with alopecia areata before intervention (b) Three months after receiving platelet-rich plasma, note the increase in hair growth.

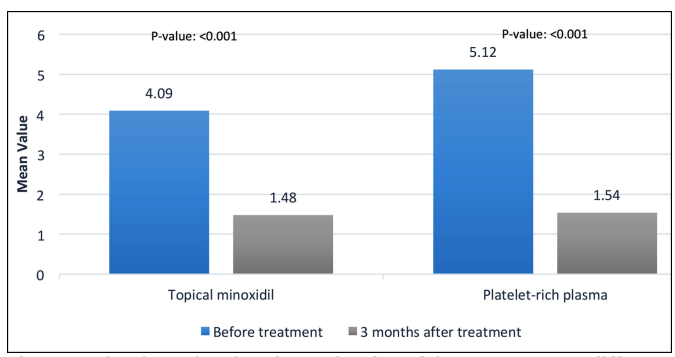

Figure 2: The chart showing the evaluation of the SALT score at different intervals of time in both groups (p = 0.483).

DISCUSSION

In this study, the majority of the patients were females, and in the 10 to 30-year age range. Patients with a disease duration of ≤3 months were somewhat more numerous. Occipital involvement was most common, followed by vertex and temporal involvement. Both groups had an efficient response to the treatment. There was no statistically significant difference in the SALT scores of both groups when compared after three months of the treatment. In comparison to minoxidil, PRP patients had a greater reduction in SALT score, but the difference was not statistically significant. The only side effect noticed in the PRP group was pain at the injection site, whereas few patients in the minoxidil group experienced side effects.

In June 2016, 90 patients were divided into three groups in the study by El Taieb *et al*., the first group received minoxidil 5% solution, the second group received PRP injections, and the third group received a placebo.[11] They came to the conclusion that PRP is a superior therapy to minoxidil 5% for treating AA over the same time period ($p = 0.05$). Despite PRP exhibiting a greater reduction in the SALT score than minoxidil in this study, there was no statistically significant difference between the two. El Taieb *et al.* used dermoscopy to assess response.

PRP treatment for AA demonstrated a satisfactory response in an earlier double-blind randomised control trial by Trink *et al*.[12] The aspect of the study that was particularly strong included dermoscopic evaluation in addition to SALT scoring and patient response was assessed at each monthly visit.

In Singh's study, 20 patients suffering from persistent AA treated with PRP were included in 2015 and all of those patients experienced hair growth, but only one patient experienced hair loss again after some time of treatment.[13] This study's flaw was that no severity tool was used to evaluate the response.

d'Ovidio *et al.* used PRP to treat 25 patients with severe chronic AA. None of the patients experienced any apparent cosmetic improvements.[14]

After the three cycles of treatment in the study done by Cervelli *et al.* on the effect of PRP injection in AA with histological and clinical evaluation, an increase in the mean number of hair compared to baseline values was seen.[15]

In 1987, Price *et al.* examined the effectiveness of topical minoxidil in treating severe AA. In that double-blind research,[16] 30 participants, with 15 in each treatment group, applied either minoxidil or a placebo. The results showed that seven of the 11 assessed participants (63.6%) in the minoxidil group and five of the 14 assessed subjects (35.7%) in the placebo group had hair growth.

This study had some limitations, including a small sample size and an average subject follow-up that was too short to draw conclusion regarding the efficacy of long-duration treatment. There was a biasness in the method of selection because only the patchy alopecia was taken into consideration for inclusion and the size of the lesion was not measured. To assess the effectiveness of PRP and minoxidil in AA, more research with a longer follow-up period and a larger number of sample size is required.

CONCLUSION

PRP and topical minoxidil 5% are effective treatment options for alopecia areata. No statistically significant difference was noted between two treatments. Moreover, PRP does not have any side effects as the topical minoxidil 5% does.

ETHICAL APPROVAL:
Ethical approval of this study was obtained from the Ethics Committee of Jinnah Post Graduate Medical Centre prior to the initiation of the research work.

PATIENTS' CONSENT:
Informed consent was obtained from the patients.

COMPETING INTEREST:
The authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:
RG: Conceptualisation and design of the manuscript.
RG, NS, SMA: Subject recruitment, data collection, analysis, interpretation, and critical evaluation of the manuscript.
All authors approved the final version of the manuscript to be published.

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