EVALUATION OF ROLE OF PRP ALONE VS PRP WITH ADJUVANT MICRONEEDLING IN THE TREATMENT OF ANDROGENIC ALOPECIA

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Abstract

Background: 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.

Objective: The objective of our study was to study efficacy of PRP and Microneedling in patients with androgenetic alopecia (AGA).

Materials and Methods: Fifty patients diagnosed with AGA were studied between September 2021 to March 2023 who did not receive any treatment for last six months. PRP was prepared by centrifugation of patients' blood. PRP done in 25 patients and PRP with Microneedling was done for other 25 patients under aseptic conditions.

Results: According to subjective scores, two patients (3.33%) had excellent results, (40%) very good, (36.6%) good, (10%) fair results, and (10%) did not have any response. Objective assessment scores showed that two patients (3.33%) had excellent results, (43.3%) very good, (35%) good, (11.6%) had fair results, and (6.7%) did not have any response There were no side effects noted either during or after the treatment.

Conclusion: This study shows PRP as an efficacious treatment for AGA and Microneedling may be combined with PRP. This study sets example for assessing the number of PRP sessions.

Keywords: Androgenic alopecia, microneedling, platelet-rich plasma

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INTRODUCTION

Androgenetic alopecia (AGA), often known commonly as baldness, is a disorder characterized by steady, predictable hair loss. This polygenetic disorder characterized by gradual, non-scaring hair loss, is brought on by hair follicle miniaturisation[1]. It can affect up to 50 and 40 per cent in men and women respectively by the age of 50 [2]. Mesenchyme-derived DP cells in the bulge region communicate with multipotent epidermal stem cells, causing the regeneration of hair follicles. At various times during the average hair cycle, a substantial number of molecular signals are present. Additionally, it appears that the growth factor BMP-4 is required for the inhibition of telogen-phase follicular expansion and differentiation [1,2].

The frontal and vertex regions commonly experience diffuse hair density loss, while the occipital and parietal regions can be affected[3]. On the other hand, women typically experience extensive hair loss[4]. Together, genetic and androgen-related causes make up the reason. Typically, it begins following puberty. Patients with the illness advance more quickly than those who are diagnosed a little later in life.The aesthetically deforming disorder known as female pattern hair loss (FPHL) affects millions of women worldwide[5]. There is a pattern to how this miniaturisation spreads. The formation and activity of various follicle cells are regulated by a collection of specialized fibroblasts i.e., dermal papilla (DP) which is crucial for regulating the hair cycle and growth [6].

Men with AGA had higher levels of prostaglandin D (PGD) and its synthetase in their scalps. These findings suggest that PGF and PGD need to be properly balanced and that prostaglandins are crucial for hair growth [7]. The development of vellus hairs results from the terminal hairs conversion into vellus hairs, which is mediated by androgen [8]. Men and women are both as susceptible to androgenic alopecia. The present study was conducted to evaluate the safety and efficacy of microneeedling monotherapy and combination of Microneedling and PRP in androgenetic alopecia.

MATERIAL & METHODS

This prospective interventional study was conducted from September 2021 to March 2023 study at Patna Medical College and Hospital (PMCH) Patna which is the largest referral hospital in Bihar with 50 Patients as sample size in this study. Based on inclusion and exclusion criteria, fifty AGA patients were chosen. These patients were split into two groups of 25 each.

Group I: only PRP

Group II: PRP and micro-needling**.**

Inclusion Criteria:

i. Participants in the process are willing.
ii. patients between the ages of 18 and 50.
iii. AGA Stage III-V Hamilton-Norwood categorization patients.
iv. Patients who, at least six months ago, did not get any sort of treatment.

Exclusion Criteria:

i. Patients with alopecia's other than AGA, such as acquired cicatricial alopecia, alopecia areata, alopecia totalis, telogen effluvium, and anagen effluvium.
ii. Those who have already experienced bleeding issues
iii. Patients using anticoagulants (heparin, aspirin, and warfarin)
iv. Patients who have an illness that is active locally.
v. Patients with a propensity to keloidal.
vi. Patients at risk for the Koebner phenomenon include those who have a history of psoriasis or lichen planus.
vii. Hepatitis, kidney problems, epilepsy, or any other serious medical condition.
viii. Patients who have inflated expectations.
ix. Patients' refusal to consent.
x. Patients who could attend routine follow-up visits were chosen for the study. Patients were included in the trial after providing written, informed permission, and the operation began.

Methodology:

i. After routine investigations blood withdrawn from antecubital vein (15-20ml).Blood was introduced in two tubes. Each tubes contains sodium citrate solution(1:9) as an anticoagulant. We utilizing the double-spin centrifugation method for PRP preparation operations, which involves spinning at 1,500-1,700 rpm for 6–10 min, then spinning again at 2,500 rpm for 15–20 minutes,PRP is collected in syringe.
ii. **For Group I:**Each patient affected scalp divided into squares and cleaned with 70% alcohol ,topicallocal anesthetic applied. PRP (0.1 ml per cm square) was injected intradermally in selected area with 30 guage1ml syringe using Nappage technique(a series of small injections spaced 1 cm apart to a depth of

1.5-2.5 mm).Procedure was repeated in every 21 days for the period of 6 months.

iii. **For Group II [micro-needling with PRP]:** The topical anesthetic was followed by washing and preparation of the scalp with betadine and sterile saline. The afflicted areas were treated with a 1.5 mm dermapen needle length eight times in the longitudinal, vertical, and diagonal directions, or until a mild erythema was noticed. After this scalp stimulation with microneedling, the extracted plasma was then applied to the affected area, massaged into the skin to assist it penetrate, and left on for the duration of the night. Each patient received a total of around08 of these sittings over the course of a total of 6 months, each spaced by 21 days. Patients were advised not to alter their hair's color or style while the trial was ongoing.

Statistical Analysis

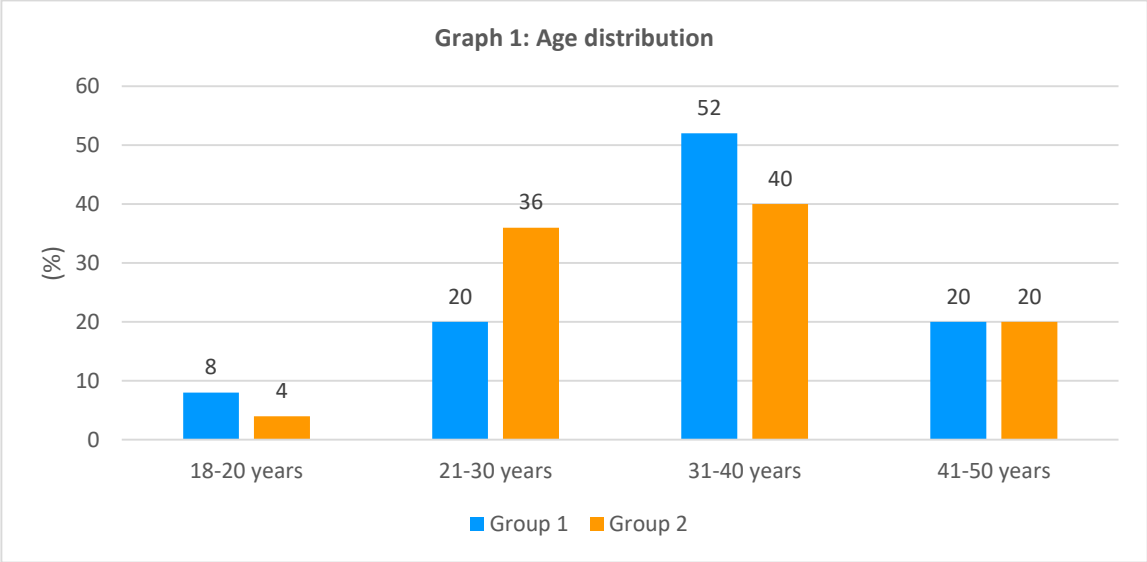
The data that was gathered was examined using IBM SPSS 23.0 statistical software. In order to explain the data using descriptive statistics, frequency analysis, percentage analysis, and mean & S.D. were used for categorical variables and continuous variables, respectively. The unpaired sample t-test was used to evaluate whether there was a significant difference between the bivariate samples in Independent groups. Before employing the Wilcoxon signed rank test for the multivariate analysis, it was essential to first conduct the Friedman test for repeated measurements. The relationship between the variables was examined using Pearson's linkage.

Both the Cohen's kappa statistic and the inter-rater reliability statistic (IRR) of the Kappa statistics were used to assess the consistency between physician and patient satisfaction. The significance of categorical data was evaluated using the Chi-square test. Each of the aforementioned statistical methods considers a probability value of< 0.05 to be significant.

RESULTS

Age Distribution

The **age distribution** of both Group 1 and Group 2, each consisting of 25 individuals, shows similar proportions across different age ranges. There is no statistically significant difference in age distribution between the two groups, as indicated by a Chi-square value of 1.87 and a non-significant p-value of 0.60.



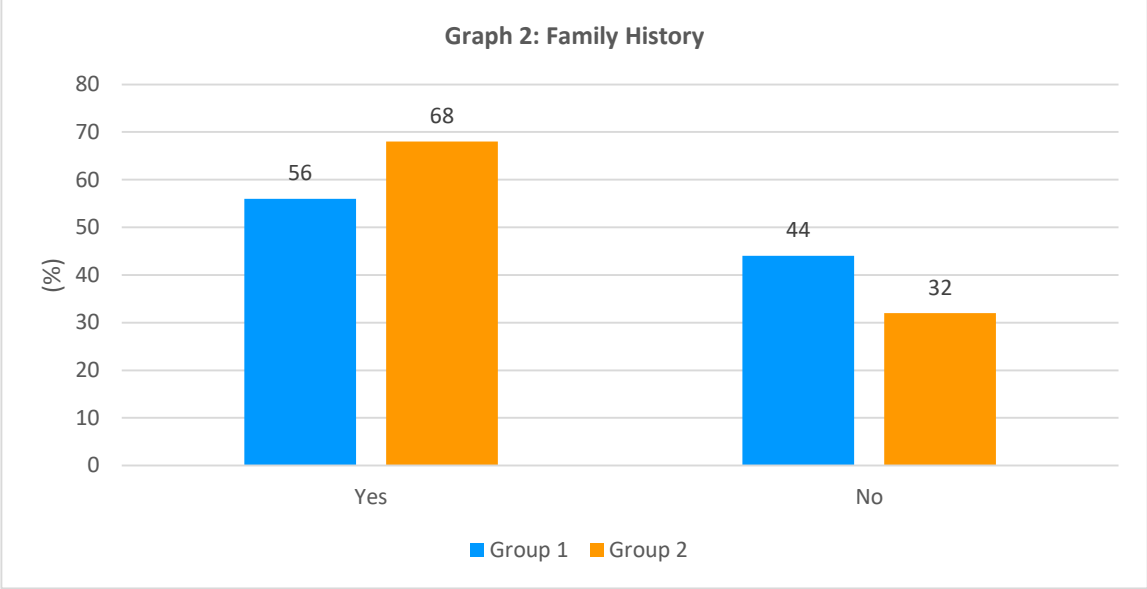
There is no statistically significant difference in mean age between Group 1 (34.56±8.09) and Group 2 (33.56±8.13), with a p-value of 0.66, indicating no significance.

Sex Distribution

In Group 1, there are 23 males (92%) and 2 females (8%), while in Group 2, there are 20 males (80%) and 5 females (20%). The Chi-square value is 1.49, and the p-value is 0.22, indicating no significant difference in sex distribution between the two group.

Family History

In Group 1, 14 individuals (56%) have a family history, while 11 individuals (44%) do not. In Group 2, 17 individuals (68%) have a family history, while 8 individuals (32%) do not. The Chi-square value is 0.76, and the p-value is 0.38, indicating no significant difference in family history between the two groups.



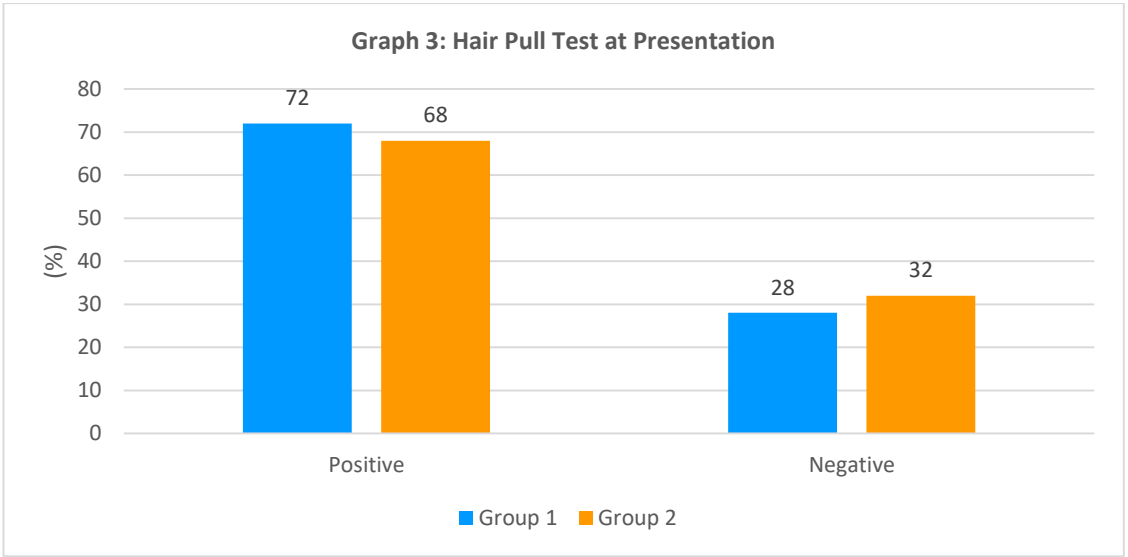
In Group 1, 15 individuals (60%) are married, while 10 individuals (40%) are unmarried. In Group 2, 14 individuals (56%) are married, while 11 individuals (44%) are unmarried. The Chi-square value is 0.08, and the p-value is 0.77, indicating no significant difference in marital status between the two groups.

Duration Of Illness

In Group 1, the average duration of illness is 18.2 months with a standard deviation of 9.25. In Group 2, the average duration is 16.16 months with a standard deviation of 9.4. The p-value is 0.44, indicating no significant difference in the duration of illness between the two groups.

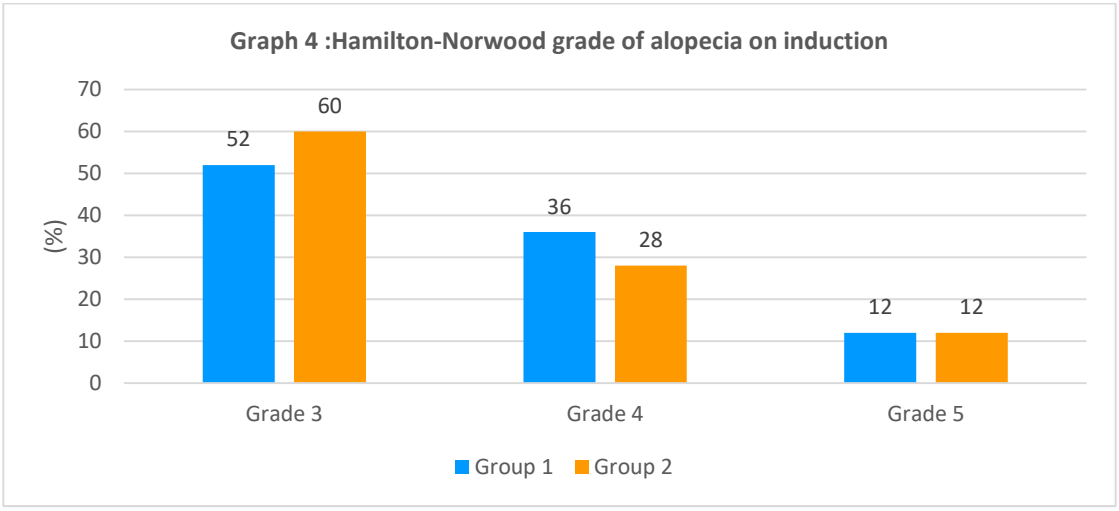
Hair Pull Test

In Group 1, 18 individuals (72%) tested positive, while 7 individuals (28%) tested negative. In Group 2, 17 individuals (68%) tested positive, while 8 individuals (32%) tested negative. The Chi-square value is 0.09, and the p-value is 0.76, indicating no significant difference in the Hair Pull Test results between the two groupsat presentation.



Hamilton-Norwood grade

In Group 1, 13 individuals (52%) have Grade 3 alopecia, 9 individuals (36%) have Grade 4, and 3 individuals (12%) have Grade 5. In Group 2, 15 individuals (60%) have Grade 3 alopecia, 7 individuals (28%) have Grade 4, and 3 individuals (12%) have Grade 5. The Chi-square value is 0.39, and the p-value is 0.82, indicating no significant difference in the Hamilton-Norwood grade of alopecia between the two groups.

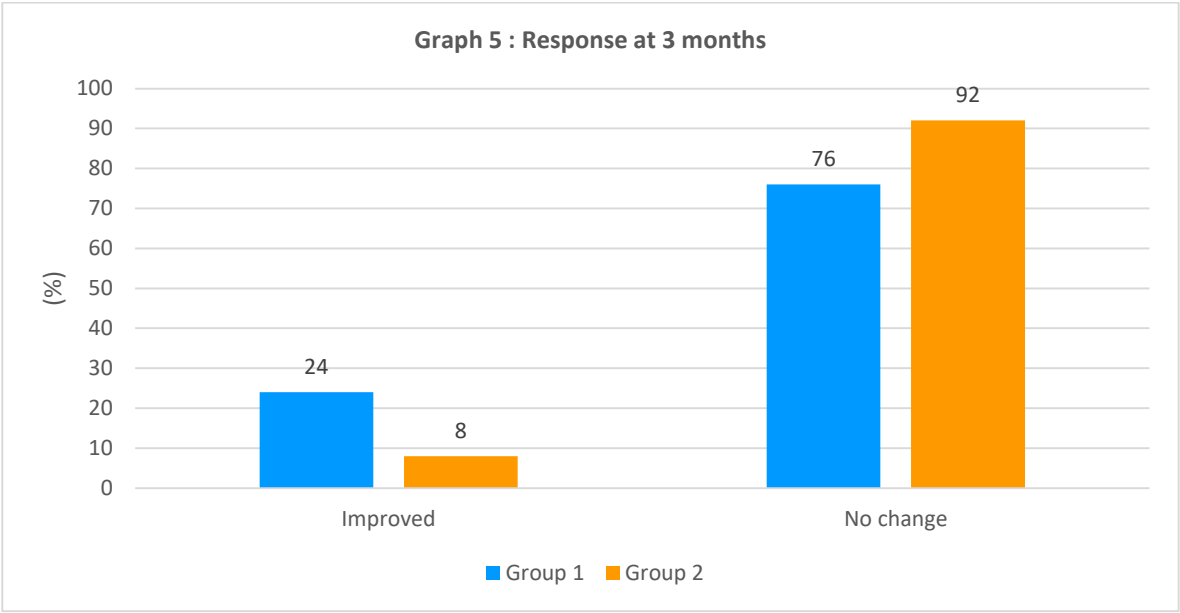


Pain Severity

In Group 1, 15 individuals (60%) reported mild pain, 7 individuals (28%) reported moderate pain, and 3 individuals (12%) reported severe pain. In Group 2, 22 individuals (88%) reported mild pain, 3 individuals (12%) reported moderate pain, and no individuals reported severe pain. The Chi-square value is 5.92, and the p-value is 0.051, suggesting a borderline non-significant difference in pain severity between the two groups.

Response

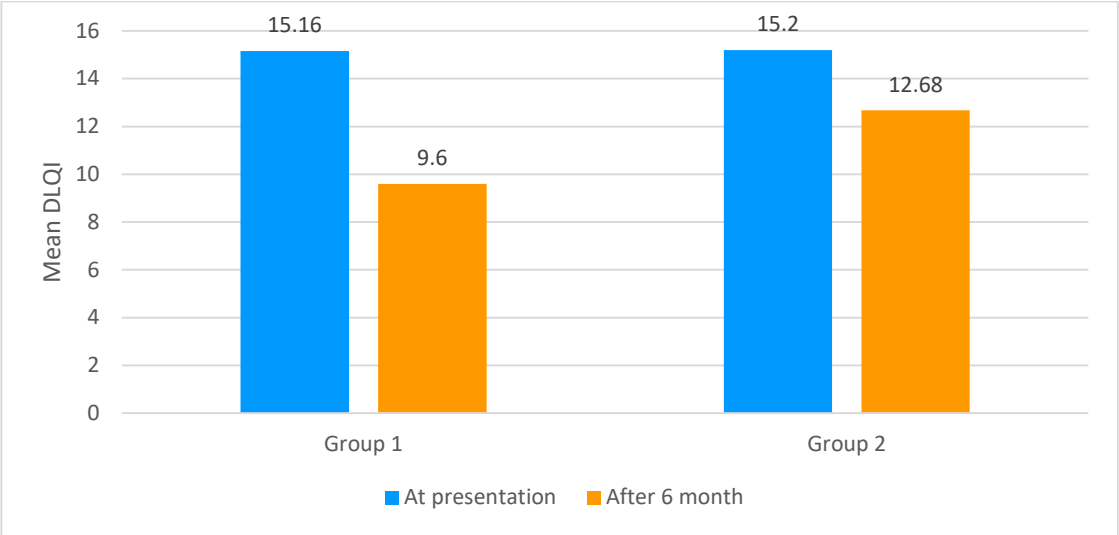
In Group 1, 6 individuals (24%) showed improvement, while 19 individuals (76%) showed no change. In Group 2, 2 individuals (8%) showed improvement, while 23 individuals (92%) showed no change. The Chi-square value is 2.38, and the p-value is 0.12, indicating no significant difference in the response at 3 months between the two group.



In Group 1, 17 individuals (68%) showed improvement, while 8 individuals (32%) showed no change. In Group 2, 10 individuals (40%) showed improvement, while 15 individuals (60%) showed no change. The Chi-square value is 3.94, and the p-value is 0.047, indicating a significant difference in the response at 6 months between the two groups.

Dermetology Quality of Life Index

At presentation, Group 1 had an average DLQI score of 15.16 with a standard deviation of 2.75, with an average DLQI score of 9.6 and a standard deviation of 3.16, whereas Group 2 had a higher average score of 12.68 with a standard deviation of 1.95. The p-value is <0.001, indicating a significant difference between the groups, where Group 1 had a statistically significant improvement in DLQI compared to Group 2.



DISCUSSION

Microneedling and platelet-rich plasma are two novel treatments for hair loss. Among the earliest trials to combine PRP and micro needling to treat AGA,this method isn't widely used in research. There were 50 AGA patients in total in this study. The patient population was divided into two groups, Group I and Group II, with 25 patients from each group being chosen. All the patients in Group I underwent PRP therapy alone for six consecutive months, while all of the patients in Group II underwent PRP therapy in conjunction with micro-needling for six consecutive months. The age range with the highest frequency in this study;between 31 and 40 years old, included 52%(group1) and 40%(group2) of the patients. The mean age of the study population was 34.56 in group1 and 33.56 in group2. A study by Ranneva et al [9] mean age was 34 years.

This study found that the average illness duration at presentation was 18.2months in Group 1 with SD 9.25 months and16.16 months in Group2 with SD 9.4 months. The mean length of the disease, in study by Hajheydri et al was 23.10 months while by KrupaShankaret al [40] was 27 months.

During study on hair pull tests in two groups we found that Group 1 had 18 participants (72%) and Group 2 had 17 participants (68%) who tested positive initially. The Chi-square test showed no statistically significant difference in patient distribution. However, at the 6-month mark, there was a significant difference in the hair pull test for Group 1 ($p < 0.05$). In Group 1, 10 people became negative at 3 months, and at 6 months, 19 individuals (76%) tested negative. The Chi-square value of 12.5 and a p-value of 0.002 indicate a significant difference over time in Group 1. In contrast, Group 2 had a p-value of 0.48, suggesting no significant difference in the hair pull test results over time. Study by Ozkan KN et al found similar result. The study comprised patients with Hamilton Norwood stages 3 through 5. In this analysis, grade 3 of the AGA presentation was most frequent. 88% of all patients were in grade3 and 4 in both the groups. The Chi-square test's 'p' value of >0.05 denoted that the distribution was statistically insignificant. Group 1 initially had 13 individuals (52%) with Grade 3 alopecia, 9 individuals (36%) with Grade 4, and 3 individuals (12%) with Grade 5.

In this study quality-of-life index scored on the basis of questionaries. The results indicate that Group 1 had higher DLQI scores at presentation compared to Group 2, suggesting a greater impact of alopecia on their quality of life. However, at the 6-month follow-up, Group 1 showed a significant improvement in DLQI scores, with a lower average score and reduced variability compared to Group 2. The p-value of <0.001 confirms a statistically significant difference between the two groups, highlighting the effectiveness of the intervention or treatment in improving the quality of life for individuals in Group 1 compared to Group 2. These findings underscore the importance of considering interventions targeting DLQI in managing alopecia.Quality of life improved from16.17 to11.92in Mansuri UU et al[10] study. The Chi-square test was used to compare the two groups, and Group I (PRP) outperformed Group II (PRP with micro needling), with a 'p' value of <0.05 indicating statistical significance. This shows that a patient's treatment response to an AGA therapy modality can be evaluated at the end of six months of treatment, even though in certain cases it may still require longer. As a result, it's critical to provide patients with advice on how long to wait to notice the effects of their treatment, how their reactions may vary depending on the modality, and how reactions may vary between individuals. This demonstrates that using PRP with micro needling

is less efficient than PRPalone. The patients who are improving with PRP also observed a larger increase in hair shaft diameter.

CONCLUSION

PRP and PRP combined with micro needling are efficient hair regrowth techniques. The comparative comparison of both methods reveals shortcomings. This study assessed the efficacy of PRP alone and PRP combined with Microneedling benefits. However, compared to its more typical counterpart, microneedling with PRP could take more time. Furthermore, micro needling can slightly raise a patient's surgical expense at private setup. The comparative comparison of both methods reveals shortcomings. Due to the fact that the Microneedling technique is less painful than the traditional method, the combined therapy was found to increase patient satisfaction and compliance. Lower pain scores related to the micro needling led to better rates of treatment success and increased patient compliance. I reached the conclusion in this study that when combined with micro needling, PRP was found to be less successful at treating AGA than PRP alone.

INFORMED CONSENT: written informed consent was taken from patients .

ETHICAL APPROVAL: ethical committee approval was taken from the institutional committee of ethics (PMCH/2020/193).

SOURCE OF FUNDING- funding source was self

CONFLICT OF INTEREST – there was no conflict of interest

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