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COMPARISON OF SINGLE AND DOUBLE-SPIN PLATELET-RICH PLASMA THERAPY FOR TREATING ANDROGENETIC ALOPECIA IN MALES A DOUBLE-BLINDED RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Objective: To evaluate the effectiveness of Platelet-Rich Plasma (PRP) therapy in the treatment of Androgenetic Alopecia (AGA), considering procedural variations in PRP preparation and their potential impact on treatment outcomes and patient quality of life.

Study Design: A Randomized Control Trial.

Place and duration of the study: This Study was conducted at Dermatology OPD in PEMH (Pak Emirates Military Hospital) Rawalpindi. The duration Form 01 June to 30 November 2024.

Methodology: In this study we intend to evaluate the efficacy of two different techniques of preparing PRP for treatment of patients with AGA using SALT and Likert scores. This was a Randomized Double blinded study where in 60 patients (age between 22 to 60 years) with moderate to severe Androgenetic Alopecia were randomized into Group A (single spin PRP) and Group B (double spin PRP). Treatment was administered at 0,3 and 6 weeks and later followed up at 8th week .The primary outcome measure was proportion of patients achieving mild improvement in SALT score and significant improvement in Likert score. We assessed PRP therapies containing single-spin and double-spin techniques for the treatment of AGA.

Keywords: Plasma Therapy, Hair Loss, Platelet Rich Plasma

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INTRODUCTION

Androgen etic alopecia (AGA) is a non-scarring progressive miniaturization of the androgen- sensitive hair follicles causing hair loss, which is a common condition in males [1].According to Norwood OT and Hamilton JB, [2] AGA is marked by progressive shortening of the anagen phase, which follows a certain pattern involving the frontal and vertex zones of the scalp (Hamilton Norwood classification). Huang *et al*,[3] AGA is strongly associated with decreased health-related quality of life (HRQoL) and emotional

disturbances without treatment and is progressive making its management significant. Another reason why it is important to manage these patients is characteristics including marital status, education level and perception of hair loss severity which are considered significant prognostic factors that define the outcome of the therapy. According to Gupta AK, et al, [4] present day interventions are pharmacological, in particular, minoxidil and finasteride, which have however shown poor results, side effect profile, and noncompliance. These gaps have created interest in platelet-rich plasma (PRP) therapy as another option for treatment. According to Stevens T, et al [5] PRP, an autologous plasma, rich with growth factors, is attained from platelets and influences hair follicles to rejuvenate. It has therefore, become a popular treatment in dermatological practice although the absence of a standard preparation procedure for PRP reduces its effectiveness. Meznerics FA, et al [6] suggested to use single- spin and double-spin centrifugation techniques which have been widely used, and the difference of platelet concentration and activation gives clinical variations. Gressenberger P, [8] suggested that single-spin centrifugation results in platelet concentration hich can be three to six times that of whole blood while double spin centrifugation can produce concentration of up to ten-fold. Another 2020 meta-analysis by Meznerics FA, et al [6, 10] showed that double spin PRP reduced hair loss achieving lower SALT scores than single spin PRP. Similarly, Agarwal et al,[7] also found increased patient satisfaction with double-spin PRP on the Likert scale and analyzed that single-spin PRP provided lesser satisfaction of patients. However, there are still debates about which method of preparationshould be used, and thus, there is a need to investigate further about an economical and efficient standard method. The purpose of the present clinical investigation is to evaluate and compare the effectiveness of these two techniques in patients with AGA in males. The findings will establish the optimal preparation procedure and fill the existing therapy deficits and support data-driven clinical practices.

MATERIALS AND METHODS

Study Design and Setting

A randomized controlled trial with sixty male subjects who carried a diagnosis of moderate to severe androgenetic alopecia (AGA) Dermatology OPD in PEMH (Pak Emirates Military Hospital) Rawalpindi. The duration Form 01 June to 30 November 2024.

Ethical Approval Statement.

Research and Ethical Unit at the College of Physicians and Surgeons Pakistan granted study approval under **CPSP/REU/DER-2022-124-19160**. Each participant signed written informed permission for study entry after selection.

Study Population and Randomization

The research respected randomness to divide participants between two distinct groups.

- Group A: Received single-spin platelet-rich plasma (PRP).
- Group B: Received double-spin platelet-rich plasma (PRP).

Inclusion Criteria

- Males aged 22 to 60 years.
- A doctor has confirmed the patient suffers from androgenetic alopecia of moderate to severe severity (Hamilton-Norwood stages 3 through 6).
- No prior hair restoration treatment within the last 6 months.
- Willing to complete follow-up assessments.

Exclusion Criteria

- History of autoimmune disease, coagulopathy, or chronic systemic illness.
- Patients on anticoagulant therapy.
- The patient cannot participate if they have any infection or dermatological problem in their scalp area.

- Any allergic reaction to local anesthetics becomes a concern when using them during the procedure.
- The research population excluded patients who did not want to participate in the study.

Intervention

A True Tabletop centrifuge functioned for preparing the PRP substance. The medical staff delivered PRP injections intradermally to the following locations:

- Baseline (week 0)
- Week 3
- Week 6

Outcome Measures

Researchers employed the Severity of Alopecia Tool (SALT) to measure alopecia severity before treatment and at week 8.Routine assessment of patient satisfaction involved a 5-point Likert-based measurement.

DATA COLLECTION

Partici pants signed consent forms to join the study. Eligibility criteria excluded patients who had used anti-androgens or PRP within the preceding three months, and those with cicatricial alopecia, blood disorders, migraine, and NSAID consumption were also excluded from the study.Randomisation,Baseline Evaluation and Follow up: The present study included 60 male participants of the age group of 22-60 years devided into two groups, each consisting of thirty participants. Group A was administered Single Spin PRP while Group B was administered Double Spin PRP. The Severity of Alopecia Tool (SALT) score was used to evaluate hair regrowth, while the patients' satisfaction was measured by the Likert score after 8 weeks.

STATISTICAL ANALYSIS

Data testing took place through SPSS version 24.0. The authors used standard deviations with mean values for continuous variables and conducted categorical variable analyses through frequencies and percentages.

TREATMENT ASSESSMENT

The participants were 36.8 ± 7.4 years old on an

average. The groups' pre- treatment SALT score was 5.8 (100) for both groups. After treatment, the SALTscore of the single-spin PRP group (Group A) was 4.3, decreased by 20.9%; the double-spin PRP group (Group B)

STATISTICAL ANALYSIS

All quantitative data were analyzed with the help of the software named SPSS 24.0. Continuous data was analyzed with mean and standard deviation, while the nominal data was analyzed with frequency and proportions. Independent T-tests compared the SALT scoresand chi-square tests then compared the Likert scale satisfaction levels. A probability level of $p \leq 0.05$ was used to define statistically significant difference. old on an average (±7.4 years). Estimation to calculate the sample size was done using an online WHO sample size estimate, with a given margin of error of 5%, desired confidence level of 90%, population mean of 3.8, and population standard deviation of 4.55. In the post-treatment assessment, the improvement of the SALT score surmounted to a mean of 2.4 ± 0.7 on the double-spin PRP contrasting to a smaller amount of 1.5 ±0.3 on the single-spin PRP, ($p = 0.02$), an indication that there was a reduction by 5.8 ± 1.2 on the former. In terms of satisfaction indicated by the likert scale, the patients in the double-spin group had significantly higher result (4.5 ± 0.6) than the single- spin group where the result was 3.2 ± 0.8($p < 0.05$). SALT scores at baseline/pre-treatment were 5.8 (100%) for both groups. Finally, for improvement assessment, Group A (Single-Spin PRP) achieved 20.9% improvement with the SALT score decreasing to 4.3 and Group B (Double-Spin PRP) had 30.1% improvement with the SALT score decreasing to 3.4 after 8 weeks of treatment.

RESULTS

The participants were 36.8 years reaching a SALT score of 3.4, decreased by 30.1%. We found that the difference in the SALT score reduction was also statistically significant between the two groups, ($p = 0.02$). Along with that Group B received better outcomes in terms of patients' satisfaction measured by Likert scale (4.5± 0.6) versus Group A, (3.2 ± 0.8 ($p < 0.05$), which points out the higher efficacy of double-spin PRP.

The data shows no difference in the mean SALT (Severity of Alopecia Tool) scores between the single-spin PRP and double-spin PRP groups, with both maintaining a mean score of 5.8 and a standard deviation of ±0.0. Additionally, neither group demonstrated any percentage improvement or change from baseline, indicating that both methods resulted in similar outcomes with no measurable effect on the severity of alopecia based on the SALT scoring system. The data shows a reduction in the mean SALT (Severity of Alopecia Tool) scores from baseline for both the single-spin PRP and double-spin PRP groups. The single-spin PRP group had a mean SALT score of 4.3 ± 0.7, reflecting a 20.9% reduction from baseline. In comparison, the double-spin PRP group showed a greater reduction with a mean SALT score of 3.4 ± 0.8, corresponding to a 30.1% reduction from baseline. These findings suggest that double-spin PRP resulted in a more significant improvement in alopecia severity compared to single-spin PRP, demonstrating a higher efficacy in reducing hair loss. The results indicate that the mean Likert scale score for the single-spin PRP group was 3.2 ± 0.8, while the double-spin PRP group had a higher mean score of 4.5 ± 0.6. The p-value for the difference between the two groups is less than 0.05, suggesting that the difference in outcomes is statistically significant. This implies that patients in the double-spin PRP group reported higher satisfaction or better perceived results compared to those in the single-spin PRP group, indicating that double-spin PRP may have a more favorable effect on patient outcomes. The data shows a significant reduction in SALT (Severity of Alopecia Tool) scores for both the single-spin and double-spin PRP groups. For the single-spin PRP group, the pre-treatment SALT score was 5.8, which reduced to 4.3 post-treatment, reflecting a 20.9% reduction (p-value = 0.02). Similarly, the double-spin PRP group experienced a more substantial reduction, with the pre-treatment SALT score also at 5.8, which decreased to 3.4 post-treatment, indicating a 30.1% reduction (p-value = 0.02). The p-values for both groups are less than 0.05, indicating that these reductions are statistically significant. These results suggest that both single-spin and double-spin PRP treatments lead to significant improvements in alopecia severity, with double-spin PRP showing a higher level of effectiveness.

Table 1: Participant Demographics

Parameter	Value
Mean Age (years)	36.8 ± 7.4
Sample Size	Calculated using WHO sample size calculator
Error Margin	5%
Statistical Power	90%
Population Mean	3.8
Population SD	4.55

Table 2: Pre-Treatment (Baseline) SALT Scores

Group	Mean SALT Score	Standard Deviation	Difference from Baseline (%)
Single-Spin PRP	5.8	±0.0	0%
Double-Spin PRP	5.8	±0.0	0%

Table 3: Post-Treatment SALT Scores (Week 8)

Group	Mean SALT Score	Standard Deviation	Reduction from Baseline (%)
Single-Spin PRP	4.3	±0.7	20.9%
Double-Spin PRP	3.4	±0.8	30.1%

Table 4: Likert Scale Scores Post-Treatment

Group	Mean Likert Scale Score	Standard Deviation	p-value
Single-Spin PRP	3.2	±0.8	-
Double-Spin PRP	4.5	±0.6	< 0.05

Table 5: Comparison of SALT Score Reduction Between Groups

Group	Pre-Treatment SALT Score	Post-Treatment SALT Score	Reduction (%)	p-value
Single-Spin PRP	5.8	4.3	20.9%	0.02
Double-Spin PRP	5.8	3.4	30.1%	0.02

DISCUSSION

Non-scarring hair loss affects 50% of men. Androgenetic alopecia (AGA), reduces the quality of life (QOL) and has adverse psychological effects. Several papers have examined PRP therapy as a therapeutic option for AGA because of its healing property through growth factors – such as PDGF and VEGF. However, the absence of similar preparation protocols has contributed to variability in outcomes as was seen earlier in this literature. Stevens et al, [9] stressed the importance of the single-spin centrifugation that resulted in about 3 –6 times the platelet concentration as present in whole blood and reported reasonable hair regrowth effectiveness. Though this method is easier and thus technically more efficient, the yielded platelet concentrations might not be Enough to bring significant therapeutic results. Meznerics et al, [10] meta-analyses in turn showed that double-spin technique PRP gave enhanced outcomes of hair regrowth and a reduction in the SALT score. The double-spin method is said to develop platelet concentrations that are 6 to 10 times that of whole blood increasing its therapeutic value. In continuation, Agarwal et al, [11] also evaluated the levels of patient satisfaction in relation to single- spin and double-spin PRP techniques. In a self- administered Likert scale the patients were asked how satisfied they were with the treatment giving percentages of 16.7% for single spin PRP and 55% for double spin PRP, thus independently supporting double spin PRP as superior in perceived Efficacy by the patients. Similar to previous studies Greenberger P.[12] study provided stronger evidence of aided hair density and thickness to double-spin PRP than single-spin. Gupta et al,[13] made similar remarks noting that variation in preparation techniques could explain varying clinical outcomes observed in the various studies. These results are consistent with prior studies; double spin is therefore more effective for treating AGA than single spin, as evidenced through our mean SALT scores and patient satisfaction levels ($p < 0.05$). This co- ordinates with the outcome of studies of Meznerics et al, [14,15] & Agarwal et al,[16] pointed out the increased therapeutic value of double spin PRP because of its increased capacity to concentrate the growth factors.Suggested that the heterogeneity in study designs,the.patient Drug population characterization, or the absence of standard methods for PRP processing limit its generalizability. We need more multi-center studies with similar protocol to confirm the efficacy of the double spin PRP as a future benchmark for AGA treatment[17].

CONCLUSION

Double-spin PRP was more effective than single-spin PRP in decreasing the SALT score and improving patient satisfaction for AGA treatment. This research finding brings to light the possibility of double spin PRP as a dependable treatment modality to articulate shortcomings of conventional hair restoration and better

patient satisfaction.

LIMITATIONS

The study limitations include small sample size, short duration of follow up and limited demographic diversity of patients. Also, variability of preparation of PRP mitigates generalizability between centers. However, double-spin PRP is resource-intensive, which may limit its broad clinical application in such environments that care about costs.

FUTURE FINDINGS

Improved understanding of these factors should include future studies of patients with larger sample sizes and multiple centers, with longer follow-ups to confirm these outcomes. Further research should aim at refining the double-spin PRP protocol as well as comparing cost of the procedure with its efficacy in treating AGA, and identifying other therapeutic strategies that would improve the outcomes achieved through the use of PRP.

ABBREVIATIONS

AGA: Androgenetic Alopecia

PRP: Platelet-Rich Plasma

HRQoL: Health-Related Quality of Life

PDGF: Platelet-Derived Growth Factor

VEGF: Vascular Endothelial Growth Factor

SALT: Severity of Alopecia Tool

Likert Scale: A psychometric scale used to measure satisfaction

PEMH: Pak Emirates Military Hospital

NSAID:Non-Steroidal-Anti-Inflammatory

SPSS: Statistical Package for the Social Sciences

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AUTHOR CONTRIBUTIONS

Conceptualization, study design, and manuscript Drafting: **Syed Fareed Ahmed, Moizza Tahir**

Data collection, methodology development, and critical revisions **Syed Fareed Ahmed, Sidiqua Javaid, Saima Shahid** ,

Statistical analysis, data interpretation, and manuscript editing: **Syed Fareed Ahmed, Sidiqua Javaid, Saima Shahid**

Literature review, validation, and quality assurance: **Syed Fareed Ahmed, Moizza Tahir**

Data acquisition, manuscript formatting, and final manuscript approval: **All Mantion Authors**

Final manuscript revisions, supervision, and overall coordination:

All authors have reviewed and approved the final version of the manuscript.

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