

Analysis of the usage of platelet - rich plasma for androgenic alopecia treatment in the department of cosmetology at a tertiary care hospital

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Abstract

Background: Platelet rich plasma (PRP) has been increasingly used in the treatment of chronic non healing ulcers, alopecia and in other conditions requiring augmentation of healing process.

Aim: To evaluate the effectiveness of autologous Platelet Rich Plasma therapy in the treatment of androgenic alopecia at a tertiary care hospital.

Materials and Methods: Platelet rich plasma was prepared from autologous whole blood. 42 androgenic alopecia patients were studied. For male alopecia patients the outcome was assessed by comparing the alopecia grade before and after PRP treatment by Norwood Hamilton classification and for female patients by Sinclair scale. Patient’s satisfaction rate was assessed by self-assessment questionnaire

Results: A total of 59.52% patients showed improvement. After PRP treatment, all 100% with Grade I, 80% with Grade II, 100% with Grade III, 50% with Grade IV alopecia showed improvement. In female

androgenic alopecia patients, 100% with Grade II alopecia showed improvement. The mean baseline platelet count of the patients was $150 \times 10^3/\mu\text{L}$ and the mean platelet count of the autologous PRP prepared was $1307 \times 10^3/\mu\text{L}$. The mean satisfaction rate by self-assessment questionnaire was 11.07.

Conclusion: In a developing country like India, autologous PRP treatment could be an affordable alternative therapy for androgenic alopecia.

Keywords: Platelet Rich Plasma, Androgenic Alopecia

Introduction

Androgenic alopecia is hereditary thinning of the hair induced by androgens in genetically susceptible men and women³. This condition is also known as male pattern hair loss¹² or common baldness in men and as female pattern hair loss in women.¹³ It has a polygenetic inheritance and is multifactorial.¹¹

PRP, an autologous fraction of peripheral blood with platelet concentration above baseline, is the simplest regenerative medicine intervention². Normal blood has

93% red blood cells, 6% platelets, and 1% white blood cells.⁷ The idea behind PRP treatment is to reverse this red blood cell: platelet ratio so that red blood cells which are less useful in the healing process are reduced and platelets are concentrated to about 94% which on activation provides a powerful concoction of growth factors needed for tissue regeneration and healing.⁷ The aim of this study is to evaluate the effectiveness of autologous Platelet Rich Plasma therapy in androgenic alopecia and the influence of factors like age, gender and socioeconomic status of patient on the treatment outcome.

Materials and methods

It is a prospective study from July 2015 to June 2016 conducted at the department of cosmetology, Stanley Medical College, Chennai, Tamilnadu. The Institutional Ethical Committee of Stanley Medical College and the University Ethical Committee of The Tamil Nadu DRMGR Medical University approved this study.

Purposive sampling was done in this study with a sample size of 42 androgenic alopecia patients. Patients aged above 18 who are advised PRP for androgenic alopecia were included in this study.

Patients who are not willing to participate in the study were excluded. Pregnant and lactating mothers were excluded. Patients with Anaemia (Hb < 10 g/dL), Critical thrombocytopenia, keloidal tendency, active infection at the treatment site were excluded. Patients who were on minoxidil, finasteride for the past 6 months were excluded.

Data analysis was done using SPSS software.

Demographic details were given in descriptive statistics.

Quantitative data was given in summary statistics.

P<0.05 was considered significant.

Regarding diagnosis, there is no gold standard for AGA. The pattern of hair loss and the degree of alopecia were assessed and graded according to Norwood Hamilton classification¹¹ for males and Sinclair classification¹² for females. Full medical history was taken in order to rule out other causes.

Global photographs were taken before starting and after completion of PRP treatment for analysing its outcome. Patients were tested for HIV, HBV and HCV. For alopecia patients PRP injections were advised monthly once for a total of 6 sittings.

Norwood-Hamilton Classification¹¹

Grade 1 - Very minor or no recession of the hair line y
minor or no recession of the hair line

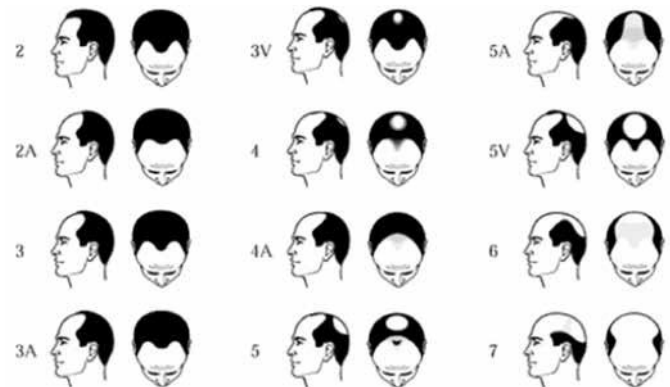


Figure 1: Norwood Hamilton classification.

Sinclair Scale¹³

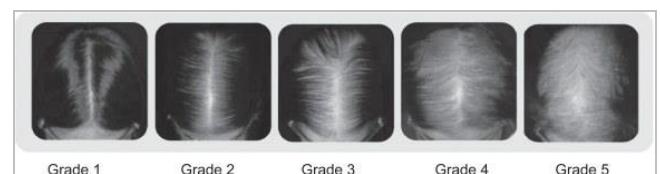


Figure 2: Sinclair Scale

Grade 1: is normal. This pattern is found in all girls prior to puberty but in only forty-five percent of women aged eighty or over.

Grade 2: shows a widening of the central part.

Grade 3: shows a widening of the central part and thinning of the hair on either side of the central part.

Grade 4: reveals the emergence of a diffuse hair loss over the top of the scalp.

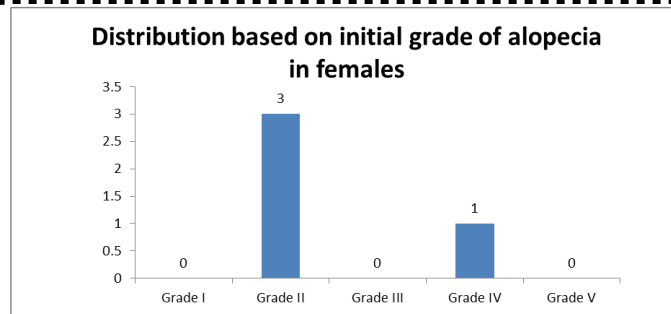
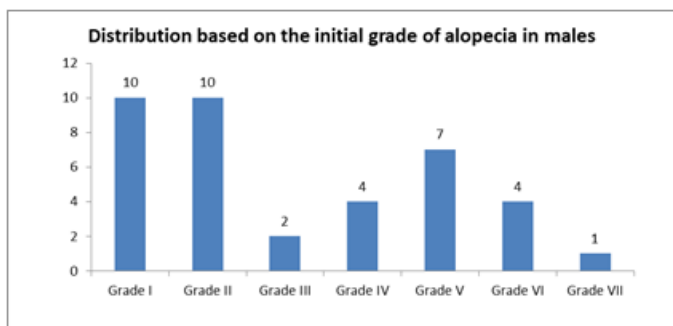
Grade 5: indicates advanced hair loss

PRP Preparation

PRP for every patient was prepared using 8-10 ml of autologous whole blood mixed with acid citrate dextrose (ACD) in the ratio 1:6.1ml whole blood was kept aside for assessing Hemoglobin, RBC count, WBC and platelet count using an automated analyser. First centrifugation is done at 1500 rpm for 10 minutes. The plasma is collected and centrifuged again at 3700 rpm for 10 minutes to obtain platelet rich plasma. Platelet-poor plasma (PPP) removed was used to resuspend the platelets. 1ml of prepared PRP was analysed for platelet count, RBC and WBC count using an automated analyser. Just before injecting prp it was activated using Calcium chloride (10%)⁸ in the ratio of 1:9. After activating the PRP, it was injected 0.1ml/cm² intradermally¹⁰ in the affected scalp areas for “alopecia” patients using insulin syringe. At the end of 6 sittings of PRP treatment the effectiveness was evaluated by the global photograph of scalp and the patient satisfaction by self-assessment questionnaire.

Results and Discussion

Chart 1: Distribution of androgenic alopecia patients based on the initial grade of alopecia in males by Norwood Hamilton Classification and females by Sinclair Scale



Distribution of male androgenic alopecia patients based on the initial grade of alopecia by Norwood Hamilton Classification showed 26.31%(10) –Grade 1, 26.31%(10) –Grade 2, 5.26%(2)- Grade 3, 10.53%(4) – Grade 4, 18.42%(7) – Grade 5, 10.53%(4) – Grade 6 and 2.63%(1) – Grade 7. Distribution of female androgenic alopecia patients based on the initial grade of alopecia by Sinclair Scale showed 75%(3) – Grade 2 and 25%(1) – Grade 4 (figure 14 & 1)

Chart 2: Distribution of androgenic alopecia patients based on Initial grades of alopecia in males by Norwood Hamilton classification and the final outcome

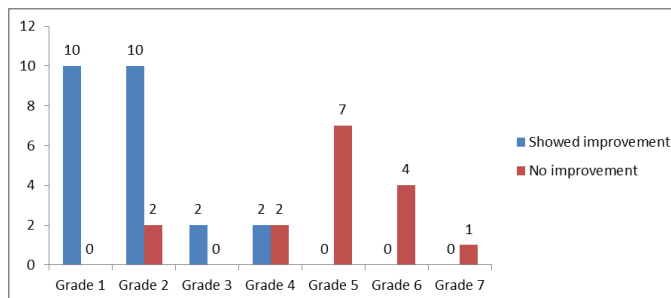


Table 1: Number of androgenic alopecia patients based on Initial grades of alopecia in males by Norwood Hamilton classification and the final outcome

Initial grade of androgenic patients	No. of patients who show improvement	No. of patients who did not show improvement
Grade 1	10	0
Grade 2	8	2
Grade 3	2	0
Grade 4	2	2
Grade 5	0	7

Grade 6	0	4
Grade 7	0	1

In our study, males were classified according to Norwood Hamilton classification and our study had all grades of alopecia. Among the 10 Grade I patients, 10(100%) showed improvement. Among the 10 Grade II patients, 8(80%) showed improvement and 2(20%) showed no improvement. Among the 2 Grade III patients, 2 (100%) showed improvement. Among the 4 Grade IV patients, 2(50%) showed improvement and 2(50%) showed no improvement. Among the 12 Grade V, VI and VII patients, 100% showed no improvement. In our study lesser grades of androgenic alopecia (I, II, III) seems to have better outcome by PRP treatment.

Chart 3: Distribution of androgenic alopecia patients based on Initial grades of alopecia in females by Sinclair Scale and final outcome

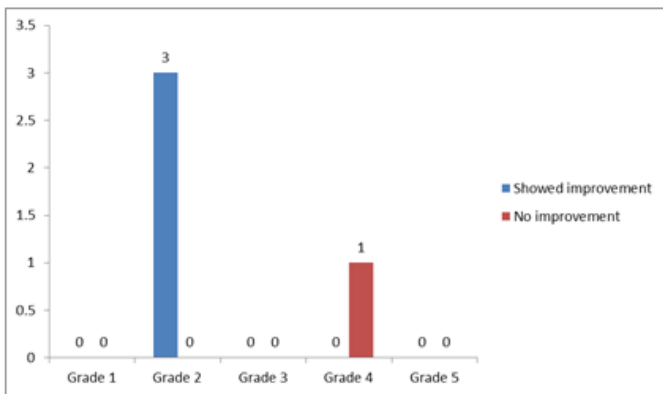


Table 2: Distribution of androgenic alopecia patients based on Initial grades of alopecia in females by Sinclair Scale and final outcome

Initial grade of androgenic patients	No. of patients who show improvement	No. of patients who did not show improvement
Grade 1	10	0
Grade 2	8	2
Grade 3	2	0
Grade 4	2	2

Grade 5	0	0
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Among the 4 females, 3(75%) belonged to Grade II and showed improvement with PRP treatment. 1(25%) belonging to Grade IV showed no improvement.

Mean values of the age of alopecia patients.

The mean of the age of the androgenic alopecia patients was 22.79 ± 5.38 (18-41) which includes males 27.92 and females 26.5.

Table 3: Mean values of haemoglobin, RBC count, WBC count and Platelet count in the whole blood from first to sixth sitting.

Sitting	Platelet count Mean \pm Standard deviation $\times 10^3/\mu\text{L}$
1 st	142.07 \pm 40.83
2 nd	148.21 \pm 33.10
3 rd	151.71 \pm 28.94
4 th	153.52 \pm 31.12
5 th	150.40 \pm 29.74
6 th	155.74 \pm 34.26

The mean baseline platelet count was $150.275 \times 10^3/\mu\text{L}$.

Table 4: Mean values of RBC count, WBC count, and Platelet count in the platelet rich plasma from first to sixth sitting.

Sitting	Platelet count Mean \pm Standard deviation $\times 10^3/\mu\text{L}$
1 st	1381.81 \pm 356.12
2 nd	1357.17 \pm 348.00
3 rd	1184.74 \pm 338.08
4 th	1239.24 \pm 282.80
5 th	1283.90 \pm 336.36
6 th	1397.48 \pm 338.92

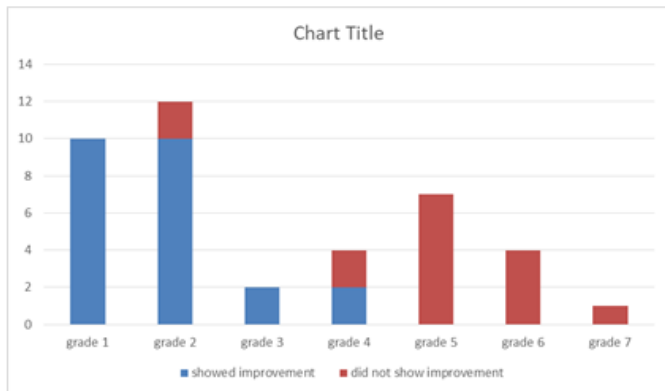
The mean PRP platelet count was $1307.39 \times 10^3/\mu\text{L}$.

The mean of Self-Assessment Questionnaire score was 11.07.

Figure 3: Global photograph of a male and female androgenic alopecia patient before and after PRP treatment.



Chart 4: Distribution of androgenic alopecia patients who showed and did not show any improvement based on Initial grades of alopecia.



Discussion

In our study the median age for males was 28 and females was 27. In Gkini et al¹⁰ study (20 patients) the mean age of patients was 34 years. In Schiavone et al¹⁴ study (64 patients, 42 male and 22 female) the median age for males was 28 and females was 32. In our study among the 38 male patients, 22(57.89%) showed

improvement and 16(42.11%) showed no improvement. Among the 4 female patients who, 3(75%) showed improvement and 1(25%) showed no improvement. In our study among the 2 patients belonging to the age group of 18-20 years, 1(50%) showed improvement and 1(50%) showed no improvement. Among the 30 patients belonging to the age group of 21-30 years, 20(66.67%) showed improvement and 10(33.33%) showed no improvement. Among the 9 patients belonging to the age group of 31-40 years, 3(33.33%) showed improvement and 6(66.67%) showed no improvement. Only one patient belonged to the age group of 41-50 years and he didn't show any improvement. In our study and Schiavone et al¹⁴ study, age and gender does not seem to influence the outcome. In Vasconcelos RCF et al¹¹ study, 18 patients showed a clearer and more satisfactory response in the female group (mean = 42.9%) as compared to the male group (mean = 25.6%).

In our study among the 17 professionals, 10 (58.82%) showed improvement and 7(41.18%) showed no improvement. Among the 4 students, 3(75%) showed improvement and 1(25%) showed no improvement. Among the 13 clerical by occupation, 7(53.84%) showed improvement and 6(46.15%) showed no improvement. Among the 6 coolies, 3(50%) showed improvement and 3(50%) showed no improvement. Among the 2 housewives, 2(100%) showed improvement. Occupation does not seem to affect the final outcome.

In our study 36 patients belonged to middle socio economic status and 6 belonged to lower socio economic status. Among the middle socio economic status patients 21 (58.33%) showed improvement and 15(41.66%) did not show improvement. Among the low socio economic status 4 (66.66%) showed improvement and 2(33.33%) did not show improvement. Socio economic status does not seem to affect the final outcome.

In our study among the 17 patients who had family history of alopecia, 11(64.70%) showed improvement and 6(35.29%) showed no improvement. Among the 25 patients who had no family history of alopecia, 14(56%) showed improvement and 11(44%) showed no improvement. Even though percentage wise improvement in final outcome was seen in patients with family history of alopecia but p value is not statistically significant.

In our study among the 18 patients who had past history of treatment for alopecia, 12 (66.67%) showed improvement and 6(33.33%) showed no improvement. Among the 24 patients who had no past history of treatment for alopecia, 13(54.16%) showed improvement and 11(45.83%) showed no improvement. Past history of treatment for alopecia does not seem to affect the final outcome.

In our study all 7(100%) A Rh (D) positive patients showed improvement. Among 10 B Rh (D) positive patients, 7(70%) showed improvement and 30% showed no improvement. Among the 21 O Rh (D) positive patients, 10(47.62%) showed improvement and 11(52.38%) showed no improvement. Among the 4 AB Rh (D) positive patients, 1(25%) showed improvement and 3(75%) showed no improvement. Blood grouping and Rh typing does not seem to affect the final outcome.

In our study among the 2 patients having smoking habit, 1(50%) showed improvement and 1(50%) showed no improvement. Among the 38 patients who do not have smoking habit, 22(57.89%) showed improvement and 16(42.11%) showed no improvement. Among the 2

patients who previously had smoking habit but abstinence from it for past 2 years, 2(100%) showed improvement. Smoking habit does not seem to affect the final outcome.

In our study among the 2 patients who had past history of alcoholism, 2 (100%) showed no improvement. Among the 40 patients who had no history of alcoholism, 25(62.5%) showed improvement and 15(37.5%) showed no improvement. Alcoholism does not seem to affect the final outcome.

In our study all patients were HIV, HBsAg and HCV non-reactive. Hence comparison of final outcome between reactive and non-reactive patients could not be done.

In our study, males were classified according to Norwood Hamilton classification¹¹ and our study had all grades of alopecia. Among the 10 Grade I patients, 10(100%) showed improvement. Among the 10 Grade II patients, 8(80%) showed improvement and 2(20%) showed no improvement. Among the 2 Grade III patients, 2 (100%) showed improvement. Among the 4 Grade IV patients, 2(50%) showed improvement and 2(50%) showed no improvement. Among the 12 Grade V, VI and VII patients, 100% showed no improvement. Among the 4 females, 3(75%) belonged to Grade II and showed improvement with PRP treatment. 1(25%) belonging to Grade IV showed no improvement. In our study lesser grades of androgenic alopecia (I, II, III) seems to have better outcome by PRP treatment. Similarly Khatu S et al¹⁵ study showed improvement in lesser grade of alopecia.

Table 5: Comparison of Our Study with Other Studies – Analysis of PRP Usage in Androgenic Alopecia

	Our study	Gkini et al ¹⁰	Schiavone et al ¹⁴	Vasconcelos RCF et al ¹¹	Khatu S et al ¹⁵
Place of study	India, Chennai	Greece	Italy	Brazil	India
Year of study	June 2015 – June 2016	October 2012 – September 2013	2012 – 2013	2015	August 2013- November 2013
No of patients	42	20	64	16	11
Method of PRP preparation	Double spin	Single spin	Single and double spin	-	Double spin
Method of PRP application	Injection in the scalp	Injection in the scalp	Injection in the scalp	Injection in the scalp	Injection in the scalp
Treatment session	Monthly once for 6 months	3 sessions with an interval of 21 days and a booster session at 6 months	1 st injection – single spin 2 nd injection after 3 months – double spin	3 injections at the interval of 21 days	4 sessions at 2 weeks interval
Alopecia grading	Male – Norwood Hamilton scale Female – Sinclair scale	Male – Norwood Hamilton scale Female – Ludwig scale	Male – Norwood Hamilton scale Female – Ludwig scale	Male – Norwood Hamilton scale Female – Ludwig scale	Norwood Hamilton scale
Outcome	Macroscopic photograph showed overall improvement Hair loss reduced at 3 months The mean patient self assessment questionnaire	Macroscopic photograph showed overall improvement Hair loss reduced at 3 months Patient satisfaction rate on linear analog scale of 1 – 10 was 7.1	Macroscopic photograph - Jaeschke rating of clinical change by 2 evaluators were 40.6% and 54.7% respectively	Macroscopic photograph and dermoscopy. In Dermoscopy - thickening of hairs, improved local circulation and increased number of follicles. Female - average improvement was 42.85% (patients) and 35.71% (external observer).	Macroscopic photograph showed moderate improvement in hair growth. Trichoscopic hair count showed increase in hair follicular density by 15.1%

	score was 11.07.			Male - average improvement was 25.55% (patients) and 18.88% (external observer).	
Adverse effects	No remarkable adverse effects	No remarkable adverse effects	No remarkable adverse effects	No remarkable adverse effects	No remarkable adverse effects

Conclusion

The emerging science of transfusion medicine is a growing field, as it applies to regenerative therapy and the platelet rich plasma treatment. PRP in particular is part of a new biotechnology. In a developing country like India, autologous PRP treatment could be an affordable alternative therapy for androgenic alopecia as it provides necessary growth factors and cytokines required for tissue healing and regeneration. Strict vigilance at maintaining sterility and regular cross-checking of the platelet values are a must to obtain consistent results. It is important to motivate both patients and clinicians to attempt these more advanced treatment modalities. Across the literature PRP is prepared by different equipments, methods and these may influence platelet degranulation characteristics which might have effect on clinical outcomes, making interpretation of the results challenging. Although it seems apparently that PRP could never be a standardised product, it could be tailored according to the specific requirements of a patient, tissue, anatomic site or lesion type¹. However, further studies on larger number of patients with long term follow-up are essential to assess the treatment outcome accurately.

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