EFFECTIVENESS OF PLATELET RICH PLASMA IN THE TREATMENT OF ANDROGENETIC ALOPECIA

Cosmetology

Manimegalai. M	Prof and Head Department of Cosmetology (Dermatosurgery), Government Stanley Medical College and Hospital, Chennai, India.
Aarthi B Krishna	Assistant Professors Department of Cosmetology (Dermatosurgery), Government Stanley Medical College and Hospital, Chennai, India.
N. Paru Priyadharsini	Department of Cosmetology (Dermatosurgery), Government Stanley Medical College and Hospital, Chennai, India.
Vidhya Livingston	Department of Cosmetology (Dermatosurgery), Government Stanley Medical College and Hospital, Chennai, India.
Hemamalini. R	Assistant Professors Department of Cosmetology (Dermatosurgery), Government Stanley Medical College and Hospital, Chennai, India.
Padam Kumar. M*	Senior Resident Department of Cosmetology (Dermatosurgery), Government Stanley Medical College and Hospital, Chennai, India.*Corresponding Author

ABSTRACT

Platelet Rich Plasma (PRP) is promising bio-technology that is fueling interest in tissue engineering and cellular therapeutics due to presence of plenty of growth factors. 100 male patients with androgenetic alopecia had completed this study between November 2017 and August 2018. In accordance with Norwood classification of male pattern baldness, 48 patients belonged to type 2 pattern, 32 patients belonged to type 3, 14 patients belonged to type 4 and 6 patients belonged to type 5 pattern of baldness. After using double spin technique, a total volume of 2-3cc of PRP was injected in the desired area of scalp. The treatment was performed monthly once for a period of 6 months. The outcome measures were assessed initially and at the end of each sitting of PRP and 3 months post completion of treatment. **Objectives** assessed were patient satisfaction using the questionnaire, macroscopic photos, hair pull test in the affected areas and follicular density using a dermascope. **Results:** Before treatment, 90% of our patients had positive pull test. With completion of 4th session of treatment, the hair pull test turned negative in all the cases. Global photographs showed a significant improvement in hair volume and quality which was bolstered up by a high overall patient satisfaction at the end of 6 sessions. Average hair follicle density improved by 18.5 - 27.88 Follicles/cm2. **Conclusion:** Platelet rich plasma injections are simple and efficient treatment option with a low cost-benefit ratio. It can be can be added in the treatment armamentarium for androgenetic alopecia, especially in sexually active males.

KEYWORDS

Platelet rich plasma (PRP), androgenetic alopecia, growth factors

INTRODUCTION:

Going bald has a significant influence on psychological aspects of the patient with a loss of self-esteem, feel of unattractiveness, depression and neurotic behaviour.[1] Moreover, treatment options approved for androgenetic alopecia in males are limited to minoxidil and finasteride, with undesirable side effects like loss of libido, increase in body hair at undesirable areas.[2] Of late, newer modalities like use of Platelet Rich Plasma (PRP), micro needling, low-level laser (light) therapy, follicle unit transplantation are emerging.[3,4,5]

PRP is promising bio-technology that is fuelling in interest in tissue engineering and cellular therapeutics. It is an exciting and innovative treatment option that is used in a wide range of medical and aesthetic issues. Being an autologous treatment, there is no possibility of side effects like allergic reactions.[6]

MATERIALS AND METHODS:

A non-randomized prospective interventional study was undertaken after obtaining institutional ethical clearance, with an objective to assess the hair re-growth pattern in patients with androgenetic alopecia on various patterns of baldness with use of autologous PRP. All male patients above the age of 18 years with clinical diagnosis of Norwood [8] grades 2, 3, 4 and 5 androgenetic alopecia who had no response to a 6 months treatment with minoxidil and finasteride, were included in the study. Period of study was between November 2017 to August 2018. Written and informed consent were obtained. Patients with Norwood grades 1, 6 and 7 androgenetic alopecia, platelet count less than 1.5 lakhs/mm3, bleeding diathesis, on oral anticoagulants, thyroid dysfunction, scalp dermatoses and other hair disorders were excluded from the study.

Thorough clinical examination of all patients was conducted before enrolling to the study. Hematological screening for complete blood count, ELISA for HIV, HBSAg, Anti- HCV was routinely carried out for all patients. Standardized hair pull test was performed in the affected areas and recorded by the same clinician before each session. Global photography in the front, lateral, vertex and back views were taken before every session in order to evaluate the overall hair volume, hair quality, growing activity and fullness. Hair follicle density was recorded using a dermascope. For further standardization, all patients were asked to avoid any type of hair care products and to use the same hair dresser during treatment period. The scalp was prepared 2 days prior to injection by regular shampooing and was disinfected by povidine-iodine.

20 ml of blood was withdrawn from each patient and anticoagulant (ACD solution) was added (1.5ml for 10ml of blood). PRP was prepared by double spin technique, 1st spin at 2000 rpm for 10 minutes. This was followed by separation and extraction of plasma, buffy coat and upper most layer of RBC's in a separate tube. This was subjected to second spin at 3000 rpm for 10 minutes. After removal of upper 2/3rd supernant containing platelet poor plasma, remaining 1/3rd of platelet rich plasma was transferred in separate tube and calcium chloride was added to the PRP in the ratio of 1:10 respectively, to activate the platelets. The activated platelet concentrate was then loaded in 1ml syringes with 30 G needle and made ready for injection. 2- 4 units of PRP was injected/cm2 area of scalp by nappage technique, in the sub-follicular plane [7] within 30 minutes of its preparation in the regions of interest. Since most of our patients were able to tolerate the injections, vibratory devices or cold rollers were used only in those patients with low pain threshold. Patients were discharged in immediate post operative period provided vitals were stable. They were followed up at monthly intervals with the next 6 sessions of PRP injection. At the end of each sitting, patients were asked to rate their response to the treatment in a scale of -2 to +2 (-2: very bad response, -

1: bad response, 0: no response, +1: mild improvement, +2: very good improvement). Patients were followed again at the end of 3 months post treatment to assess the stability of hair.

RESULTS:

A total of 108 patients were enrolled in this study. 8 men were lost for follow up, thus 100 patients completed the study. The patients belonged to the age group of 18 to 36 years with the mean age of 26.3 years. The duration of alopecia was ranging from 1 to 3 years with a mean duration of 1.56 years. The number of patients with their duration of onset of alopecia is given in Figure 1. As per Norwood's classification of male pattern baldness, 48 patients belonged to type 2 pattern, 32 patients belonged to type 3 pattern, 14 patients belonged to type 4 pattern and 6 patients belonged to type 5 pattern of baldness as given in Figure 2.

The results of influence of hair pull test in the affected area in respect to each session of PRP were tabulated (Table 1). The results of influence of treatment on hair follicle density (per cm2) in each grade of alopecia were tabulated (Table 2). The improvement in follicular density with respect to duration since onset of alopecia is tabulated (Table 3).

Figure 1: Pie chart showing number of patients with their duration of onset of alopecia
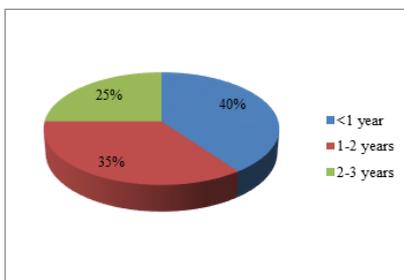

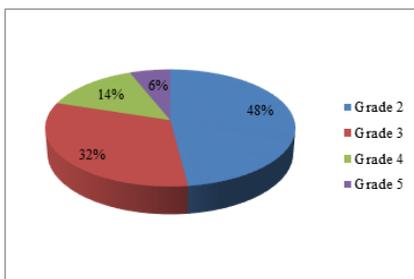### Figure 2: Pie chart showing number of patients with androgenetic alopecia in each Norwood grade

Table 1: Influence of treatment on hair pull test in the affected area of scalp:

Hair pull test	1st session	2nd session	3rd session	4th session	5th session	6th session
Positive (in % of cases)	84%	78%	54%	18%	0%	0%
Negative (in % of cases)	16%	22%	46%	82%	100%	100%

Table 2: Influence of treatment on Hair count (per cm2) in each grade of alopecia:

No. of patients in each grade of alopecia	Mean Hair count (per cm2)			P value
	Baseline	At the end of 6 sessions of PRP	changes	
Grade 2 AGA (n=48)	88.56	116.44	+27.88	< 0.0001
Grade 3 AGA (n=32)	84.97	111.62	+26.65	
Grade 4 AGA (n=14)	72.07	94.71	+22.64	
Grade 5 AGA (n=6)	65.83	84.33	+18.5	

Table 3: Improvement in follicular density with respect to duration since onset of alopecia:

duration since onset of alopecia	Mean Hair count (per cm2)			P value
	Baseline	At the end of 6 sessions of PRP	changes	
<1 year	80.1	112.5	+32.4	< 0.0001
1 – 2 years	83.91	112.11	+28.2	
2-3 years	79.76	102.76	+23	

The global pictures showed significant improvement in hair volume and quality as shown in Figure 3 and 4. The mean improvement in hair follicle density was +27.88/cm2 in grade 2 AGA, +26.65/cm2 in grade 3 AGA, +22.64/cm2 in grade 4 AGA and +18.5 /cm2 in grade 5 AGA. This finding was extremely statistically significant as the P value was less than 0.0001. The results were even more obvious in patients who suffered from alopecia of less duration with an improvement in mean follicular density by +32.4 in <1 year duration, +28.2 in 1-2 years duration and +23 in 2-3 years duration. This finding was also extremely statistically significant as the P value was less than 0.0001. The mean over all patient satisfaction score prior to initiation of treatment was -1.65 and at the end of treatment was 1.38 (Range -2 to +2) as given in figure 5. The hair growth was sustained in 67% of patients, 3 months post treatment. Side effects noted with use of PRP were minimal pain at injection site (18%) & a transient head ache (4%) which lasted for 6 to 8 hours post treatment.
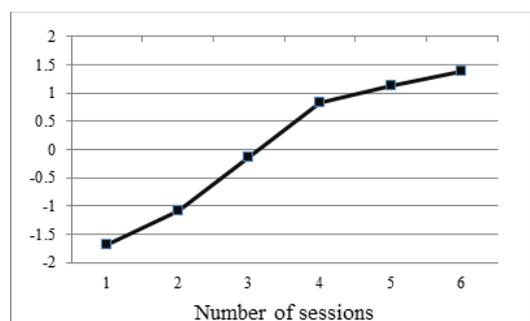
Figure 3: Results before and after 6 sittings of PRP in grade 5 AGA

Figure 4: Results before and after 6 sittings of PRP in grade 4 AGA

Figure 5: Mean overall patient satisfaction score

DISCUSSION:

Platelet rich plasma is a platelet concentrate which contains proteins like fibrin, fibronectin & vitronectin that are capable of enhancing cellular adhesion and act like a scaffold for formation of epithelium,

connective tissue and bone. Due to enriching growth factors present in PRP, it is used in treatment of musculoskeletal disorders, sports injuries and dentistry. In the field of dermatology it has found a place in treatment of androgenetic and other alopecia's, facial rejuvenation and wound healing.[9] There are different protocols and techniques used in preparation of PRP, but high platelet concentration of about 4 to 7 times the platelet count, is the single most determining factor which greatly influence the biological outcome[10]. In our study we were able to achieve an average platelet concentration which was 6.8 folds higher than the baseline platelet concentration.

The influence of PRP on the hair cycle is because of presence of growth factors like platelet derived growth factor, transforming growth factor α, fibroblastic growth factor (FGF), connective tissue growth factor, vascular endothelial growth factor, epidermal growth factor, bone morphogeneic protein, insulin like growth factor and many more. These growth factors are known to activate the proliferative phase and promote trans-differentiation of stem cells of hair to produce new follicular units.[2, 11] In-vitro studies have shown that β FGF promotes the proliferation of papillary cells and plays a key role in elongation of hair shaft.[12]

In our study, we were able to show that PRP injections for the treatment of androgenetic alopecia were highly efficient, with a high overall patient satisfaction. The hair pull test turned negative with four sessions of PRP. This finding is comparable with the study conducted by Khatu, S. S. et al.[13] The mean increase in hair follicle density was the best in grade 2 AGA, followed by grade 3, 4 and 5. This finding was extremely statistically significant as the P value was less than 0.0001. Moreover the improvement in follicular density was even more eye-catching in patients with duration of alopecia <2 years compared to those suffering from AGA >2 years. All the patients had a lasting improvement 3 months post treatment in 67% of patients. This finding is comparable with the study conducted by Gentile P et al.[14] Side effect profile was minimal with few patients reporting minimal pain at the site of injection especially in temporal regions and headache post treatment. We did not observe any case of secondary bacterial infection post treatment. This unveils the antimicrobial properties of PRP. Limitations of our study were that the follow up period post completion of the course of treatment was short. Nonetheless, our analysis was carried in strictly standardized manner, thus our results can be considered reliable and are comparable.

CONCLUSION:
Hence to summarize, PRP is simple, economical, reliable, and efficient method that can be added in the treatment armamentarium for androgenetic alopecia, especially in sexually active males where standard treatment option like finasteride are used with caution. Use of PRP with high platelet concentration, in a man with early stages and grades of androgenetic alopecia produces the best outcome.

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