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ASSESSMENT OF EFFICACY OF PLATELET RICH PLASMA IN ANDROGENIC ALOPECIA: AN OBSERVATIONAL STUDY

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INTRODUCTION:

Androgenetic alopecia (AGA) is a hereditary, androgen-dependent dermatological disorder more common in men. It is occasionally seen in women. It commonly begins by 20 years of age and affects nearly 50% of men by the age of 50 years[1]. It is a progressive thinning of the scalp hair in a defined pattern causing significant lowering of the self-esteem and psychological well-being of the patient. An androgen-dependent disorder modulated via the testosterone metabolite dihydrotestosterone (DHT) and the hair follicle-related androgen receptor (AR), it is a growing concern for the dermatologists around the world. Some genetic factors also have been implicated in its etiology[2]. The treatment modalities are limited, mainly minoxidil, 5-alpha-reductase inhibitors, and hair transplantation. These have numerous side effects ranging from hypertrichosis which is excessive hair growth, possible birth defects if given to women of childbearing age, decreased libido, and the possibility of prolonged impotence[3]

Few treatment options and those too having side effects prompted the discovery of platelet-rich plasma (PRP) which has shown remarkable beneficial effects without any major adverse reactions. PRP represents an autologous concentration of human platelets in a small volume of plasma having 4-7 times the platelet concentration above the normal blood. It is injected subcutaneously into the area of alopecia[4]. The basic idea behind PRP injection is to deliver high concentrations of growth factors to the scalp, with the hope of stimulating hair regrowth. Main growth factors (GFs) involved in androgenetic alopecia are platelet-derived growth factor (PDGF), transforming growth factor (TGF),vascular endothelial growth factor (VEGF) and insulin-like growth factor (IGF) with their isoforms[5,6,7]. The regenerative potential of PRP depends on the levels of growth factors released upon activation; therefore, PRP could serve as a potential treatment of AGA[8]. This may activate the proliferative phase of the hair, giving rise to the future follicular unit[9,10]

MATERIALS AND METHODS:

A study was conducted on 33 patients with androgenic alopecia who attended the dermatology OPD at a tertiary care centre.

Inclusion criteria:

1. All patients of age 25-40 years with Alopecia.
2. Patients who had no prior treatment for androgenic alopecia; oral or topical.

Exclusion criteria:

1. Patient not willing to participate in the study.
2. Patients with Thyroid dysfunction, anaemia, autoimmune disorders and connective tissue disorders.
3. Patients on chemotherapyay
4. Patients of alopecia areata.
5. Patients below the age of 25 years.
6. Patients who will not give written consent.

Preparation of PRP:

Twenty milliliter of fresh blood is collected from the median cubital vein into sodium citrate vacutainers under aseptic condition. The tubes are rotated in a centrifuge machine at 1500 revolutions per minute for 10 min. The first centrifugation called "soft spin" separates the blood into three layers, lowermost RBC layer (55% of total volume), topmost acellular plasma layer called platelet poor plasma (PPP, 40% of total volume), and an intermediate PRP layer (5% of total volume) called the "buffy coat." Buffy coat with PPP is collected with the help of Finn pipette in another test tube. This tube is again centrifuged at 2500 revolution per minute for 15 min called "hard spin." This allows the platelets (PRP) to settle at the bottom of the tube. The upper layer containing PPP is discarded and the lower layer of PRP is collected in another clean tube. The above process is carried out under Laminar Air Flow Hood to maintain sterility and asepsis.

Area of the scalp is cleansed with spirit and povidone-iodine. With the help of insulin syringe PRP is injected over affected area by nappage technique (multiple small injections in a linear pattern 1-cm apart) under proper aseptic precaution in the minor operation theatre. A total volume of 8-12 cc is injected. The treatment was repeated every 4 weeks for four sessions. All the patients are evaluated at 4-week intervals for a period of 6 months.

A 1 cm × 1 cm square area was marked over right parietal area in mid-pupillary line, 10 cm proximal to right eyebrow in each patient. Hair density and the hair diameter were calculated with the help of trichoscope in this area by dividing into four small quadrants. At each visit, hair count was noted over the prefixed square area. Subjective improvements of patients were noted with the help of a questionnaire. The questionnaire contained an entity and patient was asked to rate from 1 to 5 out of 5.

RESULTS:

Patients were evaluated with the help of the trichoscan and the results at the end of 3 months and end of 6 months following therapy are stated. It was found that the response differed according to the patient's characteristics like the alopecia scale, presence of family history and age.

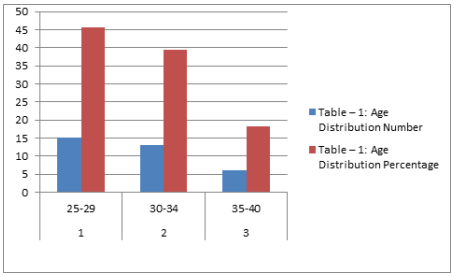
Sr no	Time duration	Hair diameter	Hair density
1	Pre-treatment	0.058±0.012	6.03±1.33
2	3 month follow up	0.079±0.016	7.53±1.54
3	6 month follow up	0.081±0.019	8.10±1.96

The pre treatment mean of the hair density, hair diameter and follicular units were 6.03±1.3, 0.058±0.0012, 78±2.3 respectively. At the end of the therapy there was increase in the hair diameter by 0.023 and increase in the hair density by 2.07.

Table – 1: Age Distribution

Sr. no.	Age group	Number	Percentage
1	25-29	15	45.54
2	30-34	13	39.39
3	35-40	6	18.18

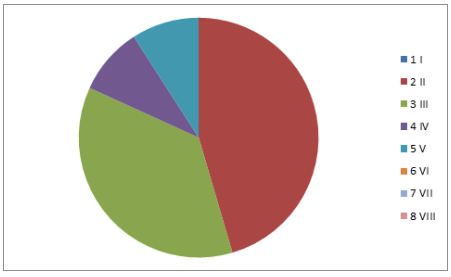
The above age distribution table showed maximum patients (45.54) in between the age group of 25-40 years. The mean age of presentation was 29.88 years with range from 25 to 40 years.



Graph 1: Age distribution

Table 2: Distribution of patients according to Norwood-Hamilton Classification scale

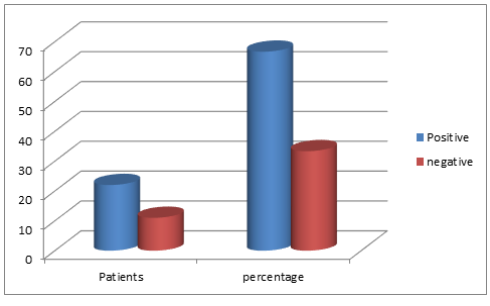
Sr. no.	Norwood-Hamilton Classification scale	Number	Percentage
1	I	0	0
2	II	15	45.45
3	III	12	36.36
4	IV	3	0.09
5	V	3	0.09
6	VI	0	0
7	VII	0	0
8	VIII	0	0



Graph 2: distribution according to classification

Table – 3: Distribution according to family history.

Sr. no	History	Patients	Percentage
1	Positive	22	66.66
2	negative	11	33.34



Graph 3: distribution according to family history

Table – 4: Increment in hair diameter and density according to alopecia grading

Sr. no	Alopecia grade	hair diameter increment in 6 months	Hair density increment in 6 months
1	II	0.023±0.005	3.10±0.6
2	III	0.022±0.006	3.01±0.8
3	IV	0.020±0.003	2.83±0.5
4	V	0.021±0.005	2.55±0.5

Table – 5: Increment in hair diameter and density according to age distribution

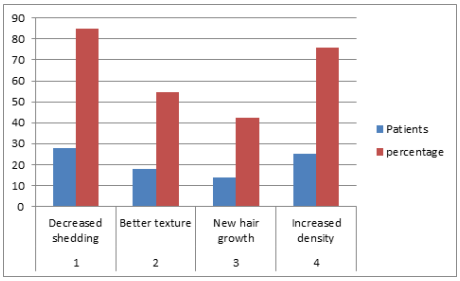
Sr. no.	Age group	hair diameter increment in 6 months	Hair density increment in 6 months
1	25-29	0.023±0.003	3.03±0.31
2	30-34	0.021±0.005	2.98±0.22
3	35-40	0.020±0.005	2.55±0.60

Subjective analysis of patients:

Patients were given a well designed questionnaire and were asked to fill up the subjective improvement which they experienced. Following table shows the parameters of subjective analysis.

Table 6: subjective analysis of patients

Sr. no.	parameter	Patients	percentage
1	Decreased shedding	28	84.84
2	Better texture	18	54.54
3	New hair growth	14	42.42
4	Increased density	25	75.75



Graph 4: subjective analysis

Trichoscopic Images of the Hair

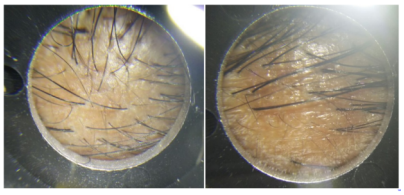


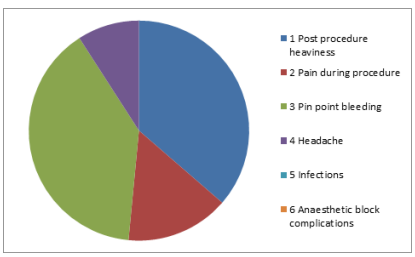
FIG.1 : PRE TREATEMENT (AFTER 4 SESSIONS) **FIG.2: AFTER 6 MONTHS**

Side effect Profile

A Variety of side effects were experienced by the patients. The most common out them was post procedure heaviness. Listed below is the side effect profile encountered in the patients.

Table 6: Side effect Profile

Sr. no.	parameter	Patients	percentage
1	Post procedure heaviness	12	36.36
2	Pain during procedure	05	15.15
3	Pin point bleeding	13	39.39
4	Headache	03	0.09
5	Infections	00	0
6	Anaesthetic block complications	00	0



Graph 5: Side effect profile

DISCUSSION:

Androgenic alopecia is a common disorder and the incidence seems to be at arising trend. At present many data is available about use of PRP in androgenic alopecia, however its efficacy still remains elucidated. The beneficial effects of PRP in AGA can thus be attributed to various PDGFs causing improvement in the function of hair follicle and promotion of hair growth. It is safe, cheap, and nonallergic, and it appears to be a useful adjuvant in the management of AGA.

An pilot study conducted by Gupta et al involved 30 male participants. Each participant received 6 PRP massage treatments after the scalp was first activated by microneedling. After 6 months of follow-up, Trichoscan evaluation of the vertex (10 cm away from glabella) showed significant increase in hair diameter and hair density. Evaluation of global photographs by a blinded observer showed an average improvement of 30.2 ± 12.2%. Self-assessment questionnaires likewise revealed improvement with PRP treatment.

A few studies are also present challenging the efficacy of PRP in androgenic alopecia In our study we found increase in the hair density as well as hair diameter at the end of six months. Patients also were overall satisfied with the treatment. The response to the therapy was however dependant of many factors like, age of patient, alopecia grade and the presence of family history.

Our study had the limitations of having small smaple size and evaluation of the therapy could have been more objective.

More controlled trial are a necessity to provide firm proof to determine efficacy of PRP in androgenic alopecia.

CONCLUSION:

PRP is an effective modality of treatment to be used as an adjuvant in treatment of androgenic alopecia. However, its solitary use in androgenic alopecia will seldom provide drastic effects. It is a cheap modality available which provides complete patient satisfaction and some evidence of hair growth like increase in diameter and density with decrease in the shedding of the hair.

Considering the safety profile and the patient satisfaction and the cost effectiveness PRP can be routinely employed as an adjuvant therapy and must be used whenever and wherever possible.

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