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Original Research Article

A randomized, double blind, placebo controlled, split patch study to evaluate the effects of platelet rich plasma on alopecia areata

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ABSTRACT

Background: Alopecia Areata is a T-cell–mediated autoimmune, often reversible disease in which the gradual loss of protection provided by immune privilege of the normal hair follicle plays an important role. It manifests as smooth, slightly erythematous (peach color) or normal-colored alopecic patches with short broken hair at the margins. It involves scalp most commonly, although other regions of body may be affected. Platelet rich plasma is an autologous concentration of platelets with a greater count in a small volume of plasma. Study aimed to evaluate the safety and efficacy of PRP therapy in Alopecia Areata.
Methods: In this randomised, placebo controlled, split patch study, 30 patients of AA were recruited and injected with 1-1.5ml of autologous PRP made by double spin method into half the bald patch area and other half with placebo using insulin syringe once a month for 3 months. Outcome was assessed at the end of study by clinical photographs as regrowth of hair, dermoscopy findings as reduction in black dots, yellow dots and exclamation hair and Physician and patient self-assessment score.
Results: Administration of autologous PRP has led to observable improvement in 20% case of PRP and only 3.3% of control cases. Decrease in number of dystrophic hair and hair regrowth with PRP was seen in 20% cases and in 17% patches.
Conclusions: PRP in our setting was found to be minimally effective, but more efficacious than no treatment, and safe for AA patients.

Keywords: Alopecia areata, Autologous PRP, Hair disorder, Platelet rich plasma, T cell mediated

INTRODUCTION

Hair plays a pivotal part in the appearance of a person. Lustrous hair exudes confidence in a person. It has mainly cosmetic implications. Persons complaining of hair problems come to the Skin OPD mainly for cosmetic/psychological purposes rather than any physical distress. Dealing with hair loss is hard, but thinking you are the only one this is happening to, makes it even harder. It can have devastating effects on the patient's quality of life and self-esteem.[1,2]

Hair grows in cycles. Each cycle consists of a long growing phase (anagen), a brief transitional apoptotic phase (catagen), and a short resting phase (telogen). At the end of the resting phase, the hair falls out (exogen) and a new hair starts growing in the follicle, beginning the cycle again. Normally, about 50 to 100 scalp hairs reach the end of resting phase each day and fall out.[3]

Alopecia is defined as loss of hair from the body. Hair loss can also be an important sign of systemic disease. The cause of alopecia areata is unknown. Currently

available evidence suggests that alopecia areata (AA) can be considered a T-cell-mediated autoimmune disease in which the gradual loss of protection provided by immune privilege of the normal hair follicle plays an important role. [4,5] Hair loss is usually the only symptom. A few people may also feel a burning sensation or itching.

Alopecia areata (AA) typically manifests as discrete circular patches of hair loss characterized by short broken hairs at the margins, which resemble exclamation points. The presence of smooth, slightly erythematous (peach color) or normal-colored alopecic patches is characteristic.[3] If hair loss is not widespread, the hair will often regrow in a few months without treatment. Dermatologists are frequently encountered with challenge of providing treatment to patients with AA. There are various modalities to treat alopecia areata with variable results. Amongst the various recent advanced therapies for the treatment of Alopecia Areata, platelet-rich plasma (PRP) has been reported effective in a few studies.[6]

There has been a burst in the application of PRP in dermatology and aesthetic medicine in recent times. PRP means abundant platelets that are concentrated into a small volume of plasma. The discovery of platelet-derived growth factor (PDGF) in promoting wound healing, angiogenesis and tissue remodelling threw light on this novel autologous therapeutic modality. Takakura et al.[7] revealed that PDGF signals in cell interactions are required for hair canal formation and growth of dermal mesenchyme, thereby opening newer perspectives for PRP in hair restoration. PRP is known to contain more than 20 different growth factors, which are important in promoting cell proliferation and differentiation.[8] These properties are thought to lead to its beneficial effects.[9,10]

Recently, the role of PRP in promoting hair growth has also been investigated. The mechanisms by which PRP exert its effects on HFs are still obscure. A recent study has shown in vitro that PRP increases the proliferation of dermal papillae cells and activates the signaling pathways extracellular signal-regulated-kinase and Akt.[11] Additionally, fibroblast growth factor-7 and beta catenin, which are both stimulators of HF growth, were stimulated after PRP administration. A study by Trink et al, gives further support to the growth-promoting effect of PRP in hair, by providing evidence that levels of Ki-67, a marker for cell proliferation, are increased after PRP administration.[12]

In addition to its proliferation-inducing effects, PRP is also a potent anti-inflammatory agent, which can suppress cytokine release and thereby limit local tissue inflammation.[12] Since AA is characterized by an extensive inflammatory infiltrate, responsible for secretion of a variety of inflammatory cytokines, it is probable that the anti-inflammatory effects of PRP may be of great benefit in this condition.

PRP contains various factors like Platelet Derived Growth Factor (PDGF) is chemotactic for fibroblasts and macrophages, Transforming Growth Factor (TGF), Vascular Endothelial Growth Factor, Epidermal Growth Factor mediate angiogenesis, Hepatocyte Growth Factor mediates regeneration, Fibroblast Growth Factor mediates tissue organization and regeneration, Fibroblast growth Factor-9 aids generation of new follicles.[13]

Effective treatment of AA presents a major challenge. However, with the advent of platelet rich plasma (PRP) therapy, new avenues for treatment of alopecia areata can be explored. We assessed efficacy and safety of PRP in AA in this study.

METHODS

This study was a randomized, double-blind, placebo-controlled, split patch study, which was conducted at a Dermatology, Venereology and Leprology Department of a tertiary care teaching hospital which caters to urban as well as rural population in central India. This study involving 30 adult patients of alopecia areata (AA), began in Nov 2014 and was completed in July 2016. Total duration of the study was 22 months.

The institutional ethical committee approved this study protocol before the start of the study. Any patient who was a new case of alopecia areata was eligible to enter the study if following criteria were fulfilled. After signing an informed consent form, these patients were screened with following inclusion and exclusion criteria for recruiting in to the study.

Inclusion criteria

Patient aged 16 years and above or legal representative willing to give informed written consent, newly diagnosed with alopecia areata, Patients of both genders, with total number of patches <5.

Exclusion criteria

Patients with potentially poor prognosis to treatment-unstable, autoimmune disease, thyroid disorder, diabetes mellitus. Patients receiving treatment with anticoagulants, or with active infection at local site; keloidal tendency. Pregnant and lactating mothers; HIV, HBV infection

Study intervention

Patient newly diagnosed AA with were randomized to PRP and placebo.

Study flow

After taking informed consent, all the patients in the study were subjected to the following clinical and experimental procedure.

History taking, Patients blood work-up, Clinical examination, Intralesional PRP and Placebo was injected intradermally in a dose of 4U (0.1mL) over a bald patch (scalp/eyebrow/moustache/beard) which was divided into two halves arbitrarily.

The side on which either PRP or placebo was injected was decided by a flip-coin method. Three sittings at an interval of 30 days were given by an uninvolved physician with a follow up of 3 months. Response to treatment was assessed by standard digital macro photography and dermoscopy at Baseline (before PRP injection), at 3 months and at 6 months after last PRP injection by two independent evaluators.

This was done to determine the number of dystrophic hair in the area of the patch. Dystrophic hair markers included exclamation-mark hair, black dot appearance of hair, yellow dot and pigtail regrowth of hair. The percentage of dystrophic hairs was evaluated on a four-point scale: 3, >50%; 2, 30-50%; 1, 1-29%; 0, no dystrophic hairs. Follow up was taken every month for clinical assessment of result and to show any progress or unresponsiveness. Physician's and patient's satisfaction scores were also used to assess response to treatment.

PRP preparation procedure

Under all aseptic conditions, 5 to 10 ml venous blood was withdrawn from antecubital vein and was collected in a sodium citrate containing vacutainer in a ratio of 1:9 (Anticoagulant: Blood). Vacutainers were centrifuged in Remi R-8C at 1200-1500 rpm for 10 mins. Plasma and buffy coat layer obtained were aspirated and was processed with ultracentrifugation at 3000 rpm for 10 mins. Activator calcium chloride was added to this. Homogenised PRP was obtained from it using a sterile syringe.

PRP injection procedure

Preparation of the site was done by cleaning with spirit and betadine topical anaesthetic spray (lidocaine 10%) or cream (lidocaine 7% and tetracaine 7%) was applied. Each patch was arbitrarily divided into two halves. Randomization for selection site for a PRP or placebo was done with a flip of coin method. Half patch was injected with 0.1ml of PRP at 1-1.5cm apart and other half with 0.1ml placebo, the same way. A total of 3 such sittings were given to each patient at an interval of 30 days, over a total period of 3 months. For patient satisfaction, patients were advised daily oral multivitamin and for application of coconut oil as topical treatment.

Outcome measures

Primary outcome measure was reduction in number of dystrophic hair or new hair growth measured by standard digital macro photography and dermoscopy.

Statistical analysis

The data analysis was performed using statistical software SPSS version 15.0. Categorical data was presented with descriptive statistics (frequencies and percentages). Mean values (standard deviation) used to summarize the quantitative variables. Statistical test used were Chi square test for comparing qualitative variables, t test for quantitative variable. Comparison of baseline parameters with change at 12 week after last treatment was done. Analysis of covariance (ANCOVA) was used to compare parameters at 6 months in two groups with baseline values as covariate. P value <0.05 was considered significant at 95% confidence interval.

RESULTS

In 30 cases enrolled in to the study, mean age was 34.9±10.1 years. 43.3% patients were below 30 years, 30% were between 31 to 40 years and 26.7% were above 40 years (Table 1).

Table 1: Distribution of age in study population.

Age (years)	Mean
Mean±SD	34.9±10.1
Age Range	20 to 59
Age groups	
<30	13 (43.3)
31 to 40	9 (30.0)
>40	8 (26.7)

Table 2: Distribution of gender in study population.

Sex	Frequency	Percent
Male	21	70.0
Female	9	30.0
Total	30	100.0

Table 3: Residence of patients.

Location	Frequency	Percent
Rural	8	26.7
Urban	22	73.3
Total	30	100.0

Table 4: Duration of alopecia.

	N	Mean	SD	Minimum	Maximum
Duration (months)	30	2.7	1.7	1	6

There were 70% males and 30% females in this study (Table 2). In the study population, 73.3% and 26.7% patients were from urban and rural background respectively (Table 3). Mean duration of alopecia in our study was 2.7±1.7 months. It ranged from 1 to 6 months (Table 4). By Ikeda classification, 93.3% cases were of

common type and 6.7% were pre-hypertensive type. There were no autoimmune of atopic type of cases. Localized patches were most common type (93.4%) whereas ophiasis and reticular were seen 3.3% each (Table 5).

Table 5: Distribution of alopecia patches in study population and two genders.

Patches	Sex		Total
	Male	Female	
1	12 (57.1%)	5 (55.6%)	17 (56.7%)
2	7 (33.3%)	3 (33.3%)	10 (33.3%)
3	1 (4.8%)	1 (11.1%)	2 (6.7%)
4	1 (4.8%)	0	1 (3.3)

P=0.847, Chi Square test

Table 6: Ikeda classification of patients.

Location	Frequency	Percent
Common	28	93.3
Pre-hypertensive	2	6.7
Autoimmune	0	0
Atopic	0	0

Table 7: Pattern of patches in study population.

Location	Frequency	Percent
Localized	28	93.4
Ophiasis	1	3.3
Reticular	1	3.3
Sisaiphio	0	0

Table 8: Associated conditions in study patients.

Condition	Frequency	Percent
Nail changes (pitting)	3	10.0

Table 9: Site of patches in study patients.

Site	Frequency (n=47)	Percent
Scalp	39	83.0
Beard	6	12.7
Eyebrow	2	4.3

Nail changes in form of pitting were evident in 10% cases (Table 6). Majority of patches were on scalp (83.0%) followed by beard (12.7%) and eyebrows (4.3%) (Table 7). There were 56.7% patients who had single patch and 33.3% patients two patches. 6.7% patients had 3 patches and only one patients had 4 patches (Table 8). Distribution of patches was nearly similar in males and females (Table 9).

Treatment outcome

Positive result was evident in 20% patients and 17% patches in PRP group whereas none of patients showed positive response to control therapy (Table 10).

Table 10: Frequency of patients with positive result in PRP and control.

Treatment	Positive Result	No Result	Total
	Number of Patients		
PRP	6 (20.0)	24 (80.0)	30
Control	0	30 (100.0)	30
	Number of patches		
PRP	8 (17.0)	39 (83.0)	47
Control	0	47 (100.0)	47

Increase of mean exclamation hair count was significant in control at 3 and 6 months (p<0.0001 for both time-period) whereas the change in PRP group was not significant either at 3 months (p=0.478) or 6 months (p=0.590). After adjusting for baseline count, mean difference in counts at 3 months (p=0.0003) and 6 months (p=0.002) was statistically significant. Percent change in exclamation hair count at 6month was -1.03% in PRP treatment and -20.2% in control treatment compared to baseline (Table 12). Increase of mean black count was significant in control at 3 and 6 months (p<0.0001 for both time-period) whereas the change in PRP group was not significant either at 3 months (p=0.164) or 6 months (p=0.420). After adjusting for baseline count, mean difference in black dot counts at 3 months (p=0.003) and 6 months (p=0.002) was statistically significant.

Table 11: Change in number of dystrophic hair in PRP group with positive result.

Parameter	PRP Group (mean±SD)				
	Baseline	3month	P value	6month	P value
Exclamation hair count	9.5±5.7	5.4±3.0	0.019	1.9±1.7	0.002
No. of black dots	26.6±22.9	14.0±10.8	0.029	4.4±4.6	0.013
No. of yellow dots	24.6±12.4	14.5±10.5	0.003	4.9±4.1	<0.000

Table 12: Change in number of exclamation hair count in two groups.

Treatment Group	Exclamation hair count (mean ±SD)				
	Baseline	3month	P value	6month	P value
PRP	14.6±7.1	14.3±7.6	0.478	14.9±8.5	0.590
Control	14.5±6.8	15.5±6.8	<0.0001	17.1±6.9	<0.0001
Adjusted mean difference (control - PRP) (95% CI)	-	1.92 (0.42, 1.96)	0.003	2.2 (0.83, 3.60)	0.002

Table 13: Change in number of black dot count in two groups.

Treatment Group	No. of Black Dots (mean ±SD)				
	Baseline	3month	P value	6month	P value
PRP	24.9±12.7	23.4±10.8	0.164	23.5±12.9	0.420
Control	25.0±12.9	26.7±13.0	<0.0001	29.1±12.9	<0.0001
Adjusted mean difference (control-PRP) (95% CI)	-	3.19 (1.10, 5.23)	0.003	5.60 (2.03, 9.17)	0.002

Paired sample t test, ANCOVA test, adjusted for baseline black dot counts

Table 14: Change in number of yellow dot count in two groups.

Treatment Group	No. of yellow Dots (mean±SD)				
	Baseline	3month	P value	6month	P value
PRP	31.2±12.7	30.2±13.7	0.223	30.3±16.2	0.545
Control	30.8±12.6	32.0±12.6	0.001	34.4±13.6	<0.0001
Adjusted mean difference (control - PRP) (95% CI)	-	2.25 (0.51, 3.99)	0.012	4.46 (1.12, 7.81)	0.009

Paired sample t test, ANCOVA test, adjusted for baseline yellow dot counts

Table 15: Safety assessment at 3 months.

Safety -Pain	Baseline		P value	3 month		P value
	PRP	Control		PRP	Control	
Mild	0	42 (89.4)		25 (53.2)	44 (93.6)	
Moderate	47 (100.0)	5 (10.6)	<0.0001	16 (34.0)	3 (6.4)	<0.0001
Severe	0	0		6 (12.8)	0	

(1-3 Mild, 4-7 Moderate, 8-10 Severe)

Table 16: Physician assessment of efficacy based on 4-point scale.

Four Point Scale	Treatment	
	PRP	Control
0	1 (3.3)	0
1	5 (16.7)	0
3	24 (80.0)	30 (100.0)

Table 17: Patient self-assessment of efficacy.

Score	PRP		P value	Control		P value
	Baseline	6 Month		Baseline	6 Month	
Poor	1 (3.3)	0		1 (3.3)	12 (40.0)	
Average	29 (96.7)	24 (80.0)	0.014	29 (96.7)	18 (60.0)	0.002
Good	0	6 (20.0)		0	0	

(1-3: Poor; 4-7: Average; 8-10: Good)

Percent change in black dot count at 6 month was -0.05% in PRP treatment and -23.6% in control treatment compared to baseline (Table 13).

Reduction of mean yellow dot count was significant in control at 3 and 6 months (p=0.001 and P<0.0001 respectively) whereas the change in PRP group was not significant either at 3 months (p=0.223) or 6 months (p=0.545). After adjusting for baseline count, mean difference in black dot counts at 3 months (p=0.012) and 6 months (p=0.009) was statistically significant. Percent change in yellow dot count at 6 month was 0.52% in PRP treatment and -14.4% in control treatment compared to baseline (Table 14).

In patients with positive responses in PRP treatment, there was significant reduction in exclamation hair count from baseline (9.5±5.7) to 3 months (5.4±3.0, p=0.019) and 6 months (1.9±1.7, p=0.013). Changes in black dot count and yellow dots count were also significant at 3 months and 6 months (Table 11).

Pain at injection site was only adverse effect reported. With PRP injection, moderate pain was reported by all

patients at baseline, whereas only 10.6% control patients reported moderate pain. At 3 months, pain with PRP injection was moderate in 34% cases and severe in 12,8% cases against only 6.4% cases of moderate pain in controls. Remaining percentage of patients reported mild pain only (Table 15).

On a 4-point scale, physician assessment of efficacy was rated as 3 in 80% PRP cases and all control cases whereas it was 0 and 1 in 3.3% and 16.7% PRP cases (Table 16).

Patient assessment revealed improvement with PRP as 96.7% reported average disease at baseline which reduced to 80% reporting average disease and 20% reporting good outcome of disease. In control, 96.7% patients reported average disease at baseline but at 6 months only 60% reported average disease and 40% reported poor disease with none reporting good outcome (Table 17).

Physician assessment of degree of improvement suggested improvement in disease as percentage of physician reporting score of >3 were 20% in PRP treatment whereas only 3.3% in control treatment (p=0.028) (Table 18).

Table 18: Physician assessment of degree of improvement in two groups.

Score	Treatment		P value
	PRP	Control	
0	24 (80.0)	29 (96.7)	0.028
3	1 (3.3)	0	
4	5 (16.7)	1 (3.3)	

(0-None; 1-25: Mild; 26-50: Moderate; 51-75: Good; 76-100: Excellent)

DISCUSSION

Alopecia areata (AA) is a common cause of non-scarring alopecia that occurs in a patchy, confluent or diffuse pattern. It may involve loss of hair from some or all areas of the body, usually from the scalp. Management of patients with alopecia areata is a challenging task as a number of risk factors have been implicated in its etiology. No definitive cure has been established, and treatment has focused mainly on containing disease activity.[3] PRP has been an evolving treatment option for AA. We evaluated efficacy of PRP in AA in this study of 30 cases.

Mean age of patients was 34.9±10.1 years. AA sufferers experience their first onset of AA by age 40 years in 82.6%-88% of patients and by age 20 years in 40.2% of patients. The mean age of onset has been reported as between 25.2 and 36.3 years.[14] Majority patients were above 30 years (56.7%). 70% were males and 30% were females. In a Similar study from Kumar et al, mean age of the patients was 27.3±5.33 years in 30 cases and 80% were males.[15] AA is not known to affect males and females differentially. However, a female predominance, ranging from a ratio of 2.6:1 to 1.2:1 has been reported. [14] Male patients are reported as receiving a diagnosis of AA at an earlier age than female patients.[14]

Most patients belonged to urban region (73.3%). Though there are no direct evidence suggesting geographic difference by urban or rural residence, environmental and psychological factors in urban areas may be precipitating factors for AA. Most patients were working class people. It remains to be studied that if occupation has any impact on AA.

Mean duration of AA was 2.7 months ranging from 1 to 6 months. This is because of inclusion of patients who had recent diagnoses of AA. Kumar et al, reported similar duration with mean of 3.3±1.8 months.[15]

Most patients in our study had single AA patch (56.7%) followed by two patches (33.3%). Only 10% had more than 2 patches. This suggests that our patients had moderate severity of AA.[3] IN total 30 cases, there were 47 patches giving average of 1.56 patches. In a similar study evaluating PRP in AA, Trink et al, reported average number patches to be 4.84, 4.93 and 4.6 in patients randomized to placebo, triamcinolone and PRP respectively.[12] The higher number of patches is probably because they included long standing patients who had mean duration of 4.36, 4.64 and 4.57 years in three groups respectively. Distribution of patches was nearly similar in males and females (p=0.847).

Ikeda classified AA based on the associated conditions and on the course of the disease.[6] Among 4 types, we observed common type in 93.3% cases and 6.7% had pre-hypertensive type. There were no atopic or autoimmune type cases. It is reported that atopic type begins early in life and mostly (30-75%) progresses to alopecia totalis (AT). Autoimmune type is seen in middle-aged groups associated with autoimmune diseases, diabetes mellitus and progresses to AT in 10-50%. Pre-hypertensive is seen in young adults whose parents are hypertensive and progress rapidly to AT in 40% of cases. Common type affects adults aged 20-40 years and AT develops in 5-15% of cases.[6] As most patients in our study were young adults and had no autoimmune or atopic disorder, common type of cases were majority.

Pattern of patches in our study revealed 93.4% patients with localized patches and 3.3% each with ophiasis and reticular patch. Ophiasis (snake-like) is a band- like AA along the posterior occipital and temporal margins. Sisaipho, also called as ophiasis inversus, presents with alopecia involving the frontal, temporal, and parietal scalp but spares hair along the scalp periphery, mimicking androgenetic alopecia. Localized patches are common in AA. Bhat et al, reported unifocal patches to be most common (n=21) whereas other presentations were rarer.[16]

Site of involvement in 83% patches was scalp, 12.8% in beard and 4.3% on eyebrows. The scalp is the most common site of involvement, with or without involvement of other body sites (such as the eyebrows, eyelashes, and beard). Specifically, the most common site was the occipital region, involved in 38.4% of males and 33.4% of females.[14]

Associated nail changes were seen in 10% cases. Evidence suggests that Nail changes occur in 10.5-38% of AA patients, with common findings including pitting, trachyonychia, and longitudinal ridging[14]. In our patients, nail pitting was the only finding. Nail changes correlated with disease severity, as they were found in more severe AA.[14] Bhat et al, reported nail changes in 10% cases.[16]

With PRP treatment, we observed positive response in 20% patients (17% patches). The response rate in our study is low as compared to finding of Kumar et al (2016)[15] who reported response in 70% AA cases receiving PRP. The difference in response cannot be explained based on specific factors as the AA features in our study and Kumar et al, study was nearly the same.[15] Probably immunological, genetic and/or environmental factors in addition to procedures deployed for PRP preparation and injection might play a role in response.

In our study, PRP and control were applied in a split-patch manner. Number of exclamation hairs, yellow dots and black dots which constitute the dystrophic hair were used as assessment parameters (Figure 1, 2).

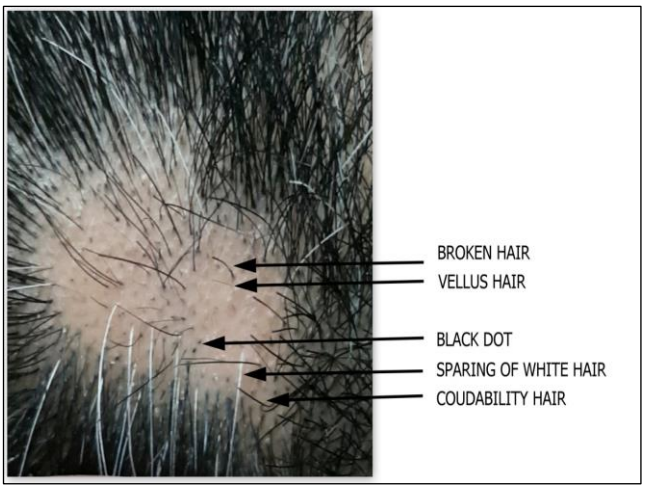

Figure 1: Macro photograph of alopecic patch, showing various features, marked by arrows.

Increase in number of exclamation hairs was significant in control group at 3 months and 6 months ($p<0.0001$) but not in PRP treatment ($p=0.478$ and 0.590 at 3 and 6 months respectively). This suggests that PRP possibly played a role in halting the progression of disease. When compared at 3 months and 6 months, we observed significant difference in mean number of hairs with (adjusted mean difference 1.92, $p=0.003$ at 3 months and 2.2, $p=0.002$ at 6 months).

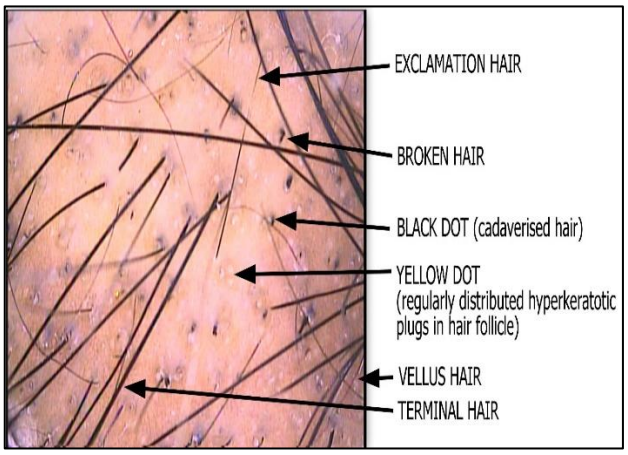

Figure 2: Dermoscopic picture of a patch showing various findings, marked by arrows.

In a similar study, Trink et al, significantly better improvement in dystrophic hairs with PRP than either placebo or triamcinolone treatment.[12] Amongst other markers, mean number of black dots remained nearly constant in PRP and increased in control group at 3 and 6 months. Adjusted mean difference in two treatments was significant with 3.19 dots ($p=0.0003$) at 3 months and 5.60 dots ($p=0.002$) at 6 months. This is in line with findings of exclamation hair count. Also, mean number of yellow dots remained constant in PRP whereas increased significantly in control at 3 and 6 months. Adjusted mean difference in two treatments was also significant with 2.25 dots ($p=0.012$) and 4.46 dots ($p=0.009$) more in control than PRP at 3 and 6 months respectively. This suggests that in a new AA cases, PRP treatment can be helpful in halting the progression and can be beneficial in-terms of reducing dystrophic hair. Study from Trink et al, was the first evolution of PRP in AA and reported significant improvement with PRP in AA compared to triamcinolone and placebo.[12] Kumar et al, also reported a significant difference of SALT (severity alopecia tool) score with better hair regrowth and better SALT score after treatment as the mean decreased, from 36.41±16.14 before treatment to 25.59±20.54 after treatment.[15] These finding suggests that PRP has a potential role in AA. These findings were further strengthened with assessment of percent change of these parameters in study population. Percent change in exclamation hair count (-1.03% in PRP and -20.2% in control), black dots (-0.05% in PRP and -23.6% in control), and yellow dots (0.52% in PRP and -14.4% in control) suggest that PRP is effective in preventing progression of disease better as compared to no treatment. Further, when we assessed the change of these parameters in those with positive response compared to no response, significant result was evident in all three parameters at 3 and 6 months of evaluation. Identifying the specific characteristics of these may explain the differences as all cases had scalp patches,

presence of 1 or 2 patches, common type of patches, urban residence, and higher number of males. These factors need further evaluation in a prospective study (Figure 3, 4).

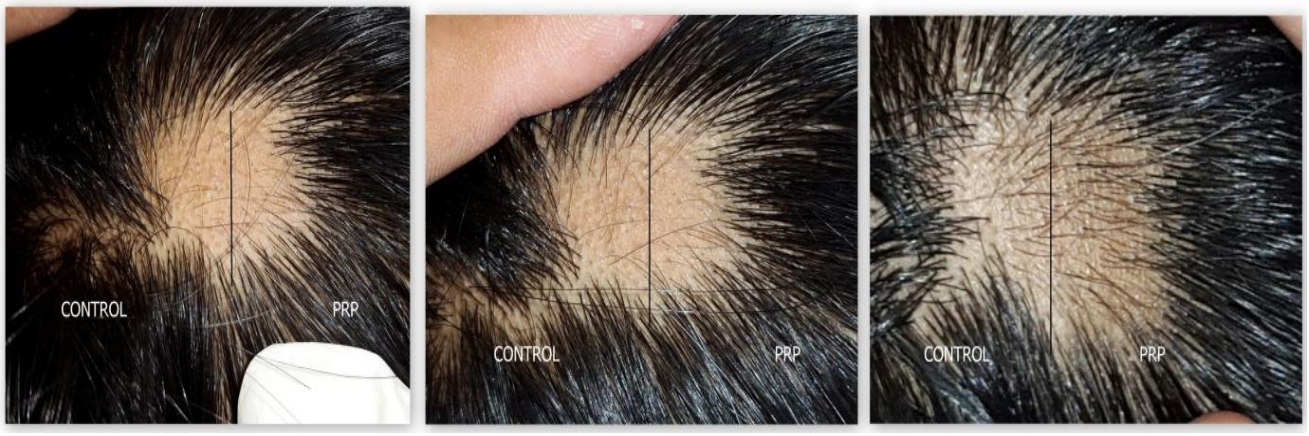

Figure 3: Regrowth of hair and increase in density in a patient with positive response to treatment (standard macrophotography). A) Baseline (To). B) Month 3 (T1). C) Month 6 (T2).

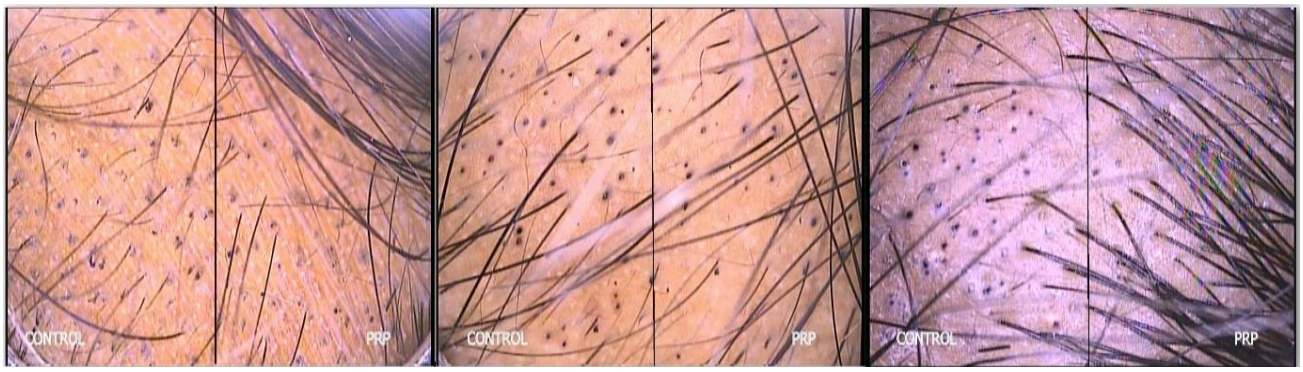

Figure 4: Positive result on test side, in terms of decrease in exclamation hair, yellow dots and black dots. (dermoscopy). A) Baseline (To). B) Month 3 (T1). C) Month 6 (T2).

Patients reported moderate pain in all patches at baseline injection of PRP whereas only 10.6% from control reported moderate pain. At the end of 3 months, moderate pain was reported in 34% patches and severe pain was in 12.8% patches. Control group reported moderate pain in 6.4% patches at 3 months ($p<0.0001$). though generally well tolerated, pain occurs in some cases of PRP. Singh et al, reported that none of the patients had any side effects after PRP, and all of them tolerated the procedure well.[17] There was no burning or itching in any patients in our case. Trink et al, reported significant reduction in these features with PRP treatment.[12]

Assessment of physician on 4-point scale revealed that majority of cases (80%) had score of 3 (>50% dystrophic hair) whereas all control cases had score of 3. Degree of improvement after assessment from physicians suggests score of 3 (one patient) and 4 (five patients) in 20% cases in PRP whereas 3.3% in control group ($p=0.028$). This correlates with above findings of improvement in various parameters. Patients assessment of treatment efficacy revealed that 20% patients found good to excellent efficacy whereas 80% found average efficacy of PRP ($p=0.014$ for comparison to baseline). IN control, disease progression was evident as poor efficacy was reported by 3.3% at baseline increasing to 40% at 6 months ($p=0.002$).

These findings suggest that PRP is minimally effective and safe in AA cases.

CONCLUSION

In our study, PRP was associated with minimal improvement in AA and probably was associated with halting of disease progression than control. Better improvement in exclamation hair count, black dots and yellow dots was evident with PRP. Both physicians and patients found better efficacy of PRP than control. Except for pain at local injection site, no significant adverse effects were reported and treatment was tolerated well with no drop out from study. Thus, PRP in our setting was found to be minimally effective, but more efficacious than no treatment, and safe for AA patients. A larger randomized study, with a longer duration of treatment and follow up is warranted to confirm our findings.

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