

# Role of Platelet Rich Plasma Therapy in Alopecia Areata- A Prospective Study

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## ABSTRACT

**Introduction:** Alopecia Areata is an autoimmune, reversible, patchy hair loss most commonly involving scalp, 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 effect of PRP therapy in Alopecia Areata.

**Material and Methods:** In this prospective study 30 patients of AA were recruited and injected with 2-3 ml of autologous PRP made by double spin method into the lesional area over the scalp by insulin syringe once a month for 3 months. Outcome was assessed at the end of study by clinical photographs as regrowth of hair, SALT Score and Itching and Burning score.

**Results:** Administration of autologous PRP has led to observable hair regrowth in 70% of patients with mean decrease in SALT Score (36.41±16.41 to 25.59±20.54, P<0.001) and Itching and burning score (1.67±0.80 to 0.27±0.45, P<0.001) respectively.

**Conclusions:** Our study suggests that PRP injections may have a positive therapeutic effect in Alopecia Areata. It is easy to perform and shows effective results without any remarkable adverse effects.

**Keywords:** Alopecia Areata, PRP, SALT Score, Growth factors

## INTRODUCTION

Alopecia Areata (AA) is a non-scarring, autoimmune, inflammatory hair loss on the scalp, and/or body. The pathogenesis of AA is still not fully understood and clinical phenotype and disease course is variable. Recently, the pathomechanism of AA has been thought to be a tissue-specific autoimmune disease and it has been speculated that melanogenesis-related protein, such as tyrosinase, acts as autoantigen.<sup>1</sup>

It is the most common condition to cause inflammation induced hair loss.<sup>2</sup> It usually presents with well differentiated patches of hair loss, which can progress to complete loss of hair from the scalp, Alopecia Totalis (AT) or from the whole body in severe cases Alopecia Universalis (AU).<sup>3</sup>

Histopathology is characterized by typical inflammatory lymphocytic infiltrates in the peribulbar region and increased number of hair follicles in a resting phase, catagen and telogen hairs.<sup>4</sup>

As most patients are relatively young and disease burden is commonly substantial so it may lead to development of psychological stress and can be associated with loss of self-esteem and depression.<sup>5</sup>

Platelet-rich plasma is defined as autologous blood with a concentration of platelets 4-7 times above baseline values.<sup>6</sup>

Platelet-rich plasma has been used since the 1990s; its use in medicine is growing due to its potential to enhance healing and soft tissue repair.<sup>7</sup>

PRP is known to contain more than 20 different growth factors, various studies suggest that the main mechanism of action is

recruitment of reparative cells by growth factors released from platelets.<sup>8</sup>

Recently, it has been found to be useful in acne scarring, wound healing, fat transplantation and also in survival and growth of hair, both in vitro and in vivo.<sup>9</sup>

But still the exact mechanisms by which PRP exerts its effects on hair follicles are not known. A recent study has shown in vitro that PRP stimulates the proliferative phase and transdifferentiation of hair stem cells and hereby produce new follicular units.<sup>10</sup>

Aim of our study was to evaluate the efficacy and safety of PRP therapy in Alopecia Areata.

## MATERIAL AND METHODS

From May 2014 to April 2015 at the department of Dermatology and STD L.L.R.M. Medical college, Meerut. 30 Patients (24 men, 6 women) of Alopecia Areata were enrolled on the basis of inclusion exclusion criteria of age 18 years and above with written informed consent who had not taken any form of treatment for it in the past 6 month. Study was approved by our institutional ethical committee.

Diagnosis was based mainly on clinical observation and inclusion criteria were –patients willing for procedure and of age group 18 years and above. Exclusion criteria were- Patients with history of bleeding disorder, on anticoagulant medications (aspirin, warfarin, heparin) with active infection at local site having keloidal tendency or psoriasis or lichen planus because of risk of koebner phenomenon with low pain threshold and having Alopecia Totalis or Alopecia Universalis.

All the patients of Alopecia Areata were subjected to the detailed history including- Demographic, disease, treatment, family, past medical and surgical history.

Systemic examination was done to exclude any associated systemic disease. Cutaneous examination was done to diagnose AA lesions with a special emphasis on number and symmetry and to exclude any scalp or hair disorders.

Following investigations were carried out in each patient- Complete Blood count, bleeding time, clotting time, Blood Sugar, Thyroid Profile.

PRP was prepared from patient's own blood, drawn at the time of treatment. 20cc venous blood drawn will yield 2-3cc of PRP. PRP was prepared by a process known as differential

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centrifugation. In it acceleration force is adjusted to sediment certain cellular constituents based on different specific gravity.<sup>11</sup> Patients should not be on any medication, including aspirin and other non-steroidal anti-inflammatory drugs, during the 2 weeks before this study.

PRP was prepared by using a double-spin method.

The equipment's we used were- Digital Bench Top Centrifugation machine, Tarson Pasteur Pipette, Tarson 14ml conical test tubes, 10 ml syringe, Insuline syringe, sodium citrate solution 3.8% w/v, 10% calcium chloride solution.

All steps were done under complete aseptic sterile condition.

1. 9cc of whole blood was withdrawn in two 10 ml syringes containing 1 c.c. 3.8% Sodium Citrate solution as an anticoagulant with ratio 1:9 (anticoagulant : blood) from the patient undergoing PRP treatment. Then it was divided into 4 test tubes each containing 4.5 ml of blood.
2. The citrated blood was centrifuged at 1500 rpm for 5 minutes in 4 test tubes known as soft spin.
3. At the end of centrifugation the whole blood was divided into 3 parts: the bottom layer consists mostly of RBCs, an upper layer that contains some platelets and WBC and in between them third part, buffy coat that is rich in platelets and WBC.
4. The upper layer and superficial buffy coat were transferred by micropipette into two sterile test tubes.
5. Then centrifuged again at 3000 rpm for another 5 minutes known as hard spin to aid in formation of soft pellets at the bottom of tube.
6. The upper portion of volume, that is 2/3<sup>rd</sup> composed mainly of platelet poor plasma (PPP) was collected and was used for massage after PRP injection.
7. PRP which is lower 1/3<sup>rd</sup> part after homogenization taken into two insulin syringes containing .2ml/ml calcium chloride as activator.
8. Then PRP was immediately injected into the area of AA over the scalp in amount of .1ml/cm<sup>2</sup> by insulin syringe.

Since life of Platelet is very short, therefore all necessary operations are consecutive.

Platelet counts were checked frequently. PRP injections were given once every month for 3 months.

All Patients were evaluated at every visit and assessment was done at the end of study (3<sup>rd</sup> month) by-

1. SALT Score- Which represent hair regrowth as percentage of change from baseline by independent observer evaluation of clinical photographs taken at each visit.
2. Subjective assessment of burning/itching sensation was also performed on a 4-point scale: 3- strong, 2-moderate, 1-mild, 0-no burning/itching sensation.

## STATISTICAL ANALYSIS

For statistical analysis SPSS software for windows, version 17.0 was used. Chi-square test was used For non-continuous data. Analysis of variance test was used to measure the mean and standard deviation of various treatment groups. Paired t-test was used for intra-group comparison. Value of 'P' <0.05 was indicative of significant difference.

## RESULTS

30 patients were enrolled with single to multiple (1-5 and mean

2.4±1.02) distributed AA scalp patches with age ranging from 20-36 years (27.3±5.33 years). There were twenty four males (80%) and six females (20%) patients. All patients had normal blood investigations (Complete Blood count, bleeding time, clotting time, Blood Sugar, Thyroid Profile).

All patients 30 (100%) reported sudden onset with 09 patients (30%) having progressive course and 21 patients (70%) having

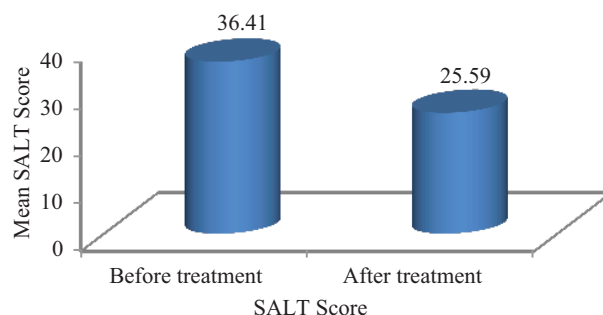


Figure-1: Comparison of SALT Score before and after PRP treatment

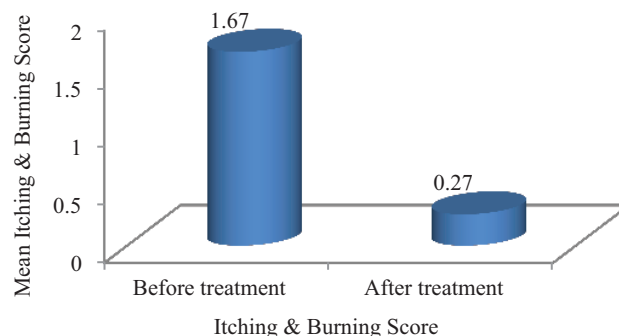


Figure-2: Comparison of Itching and Burning Score before and after PRP treatment



Figure-3: Result in a 24 year male of Alopecia Areata Before and After 3 sittings of PRP treatment

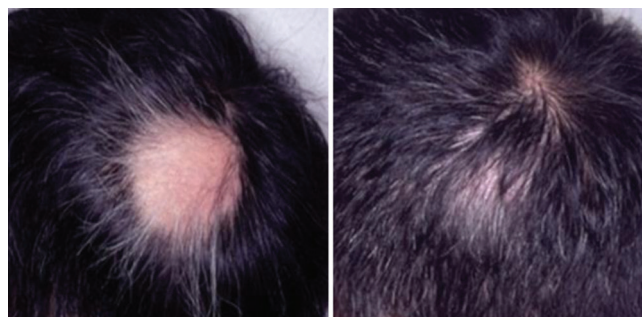


Figure-4: Result in a 26 year male of Alopecia Areata Before and After 3 sittings of PRP treatment

stationary course. The mean of disease duration was  $3.3 \pm 1.8$  months.

Patients were further subdivided into two groups- responders 21 (70%) and non-responders 09(30%). the mean age among responders was  $27.24 \pm 5.4$  yrs and among non-responder was  $27.44 \pm 7.4$  yrs. Out of 30 patients, (70.83%) males showed response compared to (66.67%) females who responded to treatment. There was no significant difference between the two groups (responders and non-responders) as regards to patient's age, sex.

There was a significant difference of SALT score with better hair regrowth and better SALT score after treatment as the mean decreased, from  $36.41 \pm 16.14$  before treatment to  $25.59 \pm 20.54$  after treatment.

There was a significant difference of Itching and burning score with better Itching and burning score after treatment as the mean decreased from  $1.67 \pm 0.80$  before treatment to  $0.27 \pm 0.45$  after treatment.

## DISCUSSION

Alopecia Areata (AA) is characterized by rapid and complete loss of hair in one or more round to oval patches, usually on the scalp but can involve any part of body.<sup>12</sup>

AA is considered an organ-specific autoimmune disease, stemming from loss of the hair follicle's (HFs) immune privilege.<sup>3</sup>

Mostly the therapies are immunosuppressive and treatment is still challenging. None of the available treatment is completely curative or preventive.<sup>14</sup>

Platelet rich plasma (PRP) is an autologous preparation of platelets in concentrated plasma.<sup>15</sup>

PRP is known to contain more than 20 different growth factors, The growth factors contained in platelets of blood plasma include platelet derived growth factor, transforming growth factor- $\beta$ , vascular endothelial growth factor, epidermal growth factor, and connective tissue growth factor. They are known to activate the proliferative phase and trans differentiation of hair and stem cells and thereby produce new follicular units.<sup>16</sup>

We relied in our observations on the fact that the characteristic of hair regrowth in Alopecia Areata is, the emergence of vellus or indeterminate hair that may give an idea of the potential utility of a new therapeutic agent and promise of responsiveness of a patient to treatment that would be followed by hair pigmentation.<sup>17</sup>

At the end of the study about 21 (70%) patients had a complete regrowth of pigmented hair, while 9 (30%) patients had partial/no regrowth of hair.

Our results showed statistically significant improvement in SALT score and Itching and Burning score with regrowth of hair in PRP treated patches of 70% of our patients.

Our study had shown that the age, gender, disease duration or course had no influence on the effect of PRP in responding patients which further strengthens the potent local effect of PRP. Since AA is characterized by an extensive inflammatory infiltrate, responsible for secretion of a variety of inflammatory cytokines, it is possible that the anti-inflammatory effects of PRP may be of great benefit in this condition.<sup>18</sup>

There was tolerable temporary burning sensation which disappeared shortly after injection but no other side effects were

noticed. All patients had no relapse at the end of the study or after 6 months of follow up.

Other investigators reported some side effects or complications, the main side effect being local infection and pain at the site of PRP injection.

We have achieved our results by using platelet count done on each patient that yielded a mean platelet count value of 11,60000/ $\mu$ L with a range of 750,000 to 14,00000/ $\mu$ L. The platelet count must be one of the most important factor to standardize studies investigating the role of PRP therapy in Alopecia Areata.

Beside quantitative value any alterations in the quality of platelets during its preparation may affect the regenerative potential of PRP, but our study is limited to this point.<sup>19</sup>

However, the challenge remains to evaluate the results using objective parameters, such as histopathological and/or dermoscopic evaluation.

Taken together the present study suggests autologous PRP as a potential treatment modality for AA, being a safe and a more efficient alternative for other therapeutic modalities.

## CONCLUSION

PRP has emerged as a new treatment modality. It is easy to perform and shows effective results without any remarkable adverse effect in the treatment of Alopecia Areata and can be regarded as a valuable alternative for treatment of it. However histopathological and dermoscopic studies are needed to detect ultrastructural changes following PRP injection in Alopecia Areata.

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