

# The Effect of Platelet Rich Plasma on Hair Regrowth: A Clinical Study

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**Abstract:** *This study investigates the effect of Platelet Rich Plasma PRP on hair regrowth in patients suffering from pattern hair loss. A total of 30 patients were selected, with PRP prepared from a small volume of their blood and injected into their scalps. The treatment was administered three times at 30 - day intervals. The endpoints were hair regrowth, hair dystrophy as measured by dermoscopy, and comparison of global photographs. The results showed clinical improvement in the mean number of hairs, with no side effects noted during treatment. However, 4 patients reported progressive hair loss 16 months after the last treatment. The study concludes that PRP may serve as a safe and effective treatment option against hair loss, and it works synergistically with other topical drugs like finasteride and minoxidil for hair regeneration.*

**Keywords:** Platelet Rich Plasma, Hair Regrowth, Pattern Hair Loss, Hair Dystrophy, Dermoscopy

## 1. Introduction

Hair loss, also known as alopecia, can have many causes. Hair loss is a common condition that affects both men and women. The epidemiology of hair loss can vary depending on the type of hair loss and the population being studied.<sup>1</sup> The pathophysiology of hair loss can vary depending on the types of hair loss.

Androgenetic alopecia (AGA), also known as male or female pattern baldness is the most common cause of hair loss. It is caused by a combination of genetic and hormonal factors. It affects around 50% of men and 30% of women over the age of 50. The prevalence of AGA increases with age. The hair follicles in people with AGA are sensitive to the androgen hormone dihydrotestosterone (DHT), which causes the hair follicles to shrink and produce finer, shorter hair. Over time, the hair follicles can become so small that they no longer produce hair.<sup>1, 2, 3</sup>

Telogen effluvium (TE) is a temporary form of hair loss that occurs when a large number of hair follicles enter the resting phase of the hair growth cycle. It can be triggered by a variety of factors, including stress, hormonal changes and certain medications. During TE, more hair follicles enter the telogen phase (the resting phase) than normal, leading to a greater number of hairs falling out.<sup>2</sup> Alopecia areata is an autoimmune disorder that causes hair loss on the scalp and other parts of the body. It is thought to be caused by a combination of genetic and environmental factors. It affects around 2% of the population. It occurs when the immune system mistakenly attacks the hair follicles, causing inflammation and hair loss.<sup>1, 2</sup> Scarring alopecia is also known as cicatricial alopecia and it is a rare type of hair loss that is caused by damage to the hair follicles. It can be

caused by a variety of factors, including inflammatory skin conditions, infections and certain medical treatments. The prevalence of scarring alopecia is not well established, but it is thought to be rare. The damage to the hair follicles is irreversible, leading to permanent hair loss.<sup>2</sup> Traction alopecia is a form of hair loss caused by tight hairstyles that pull on the hair and damage the hair follicles.<sup>2</sup> Nutritional deficiencies, a lack of certain vitamins and minerals, such as vitamin D, vitamin B<sub>12</sub>, and zinc, can cause hair loss.<sup>4</sup> Certain medical conditions, such as trichotillomania, thyroid disease and lupus, can cause hair loss.<sup>2</sup> Some medications such as anticoagulants, chemotherapy, antidepressants and birth control pills, can cause hair loss as a side effect.

Overall, hair loss is a complex condition with various types, causes, levels of severity and the pathophysiology.

## 2. Materials and Methods

30 patients were included in the study and PRP, prepared from a small volume of blood was injected on half of the selected patients' scalps with pattern hair loss. Three treatments were administered to each patient at 30 - day intervals. The endpoints were hair regrowth, hair dystrophy as measured by dermoscopy and comparison of global photographs. Patients were followed for 2 years.<sup>3</sup> patients were excluded.

## 3. Treatment

Many treatments for androgenetic alopecia are available which includes anti - androgen medications (finasteride), corticosteroids, immunomodulators, hormonal treatment, surgery, physical therapies (Laser therapy, Growth factors,

Platelet - Rich Plasma therapy), nutritional supplementation and counselling.<sup>3</sup>

Platelet - rich plasma (PRP) has emerged as a new treatment modality in regenerative plastic surgery and preliminary evidence suggests that it might have a beneficial role in hair regrowth.<sup>6</sup> PRP therapy is a medical treatment that uses a patient's own blood to promote healing and tissue regeneration. The treatment involves taking a small sample of the patient's blood, which is then processed to concentrate the platelets and growth factors. The concentrated platelets are then injected into the scalp, where they are thought to promote hair growth by stimulating the stem cells in the hair follicles.<sup>6</sup>

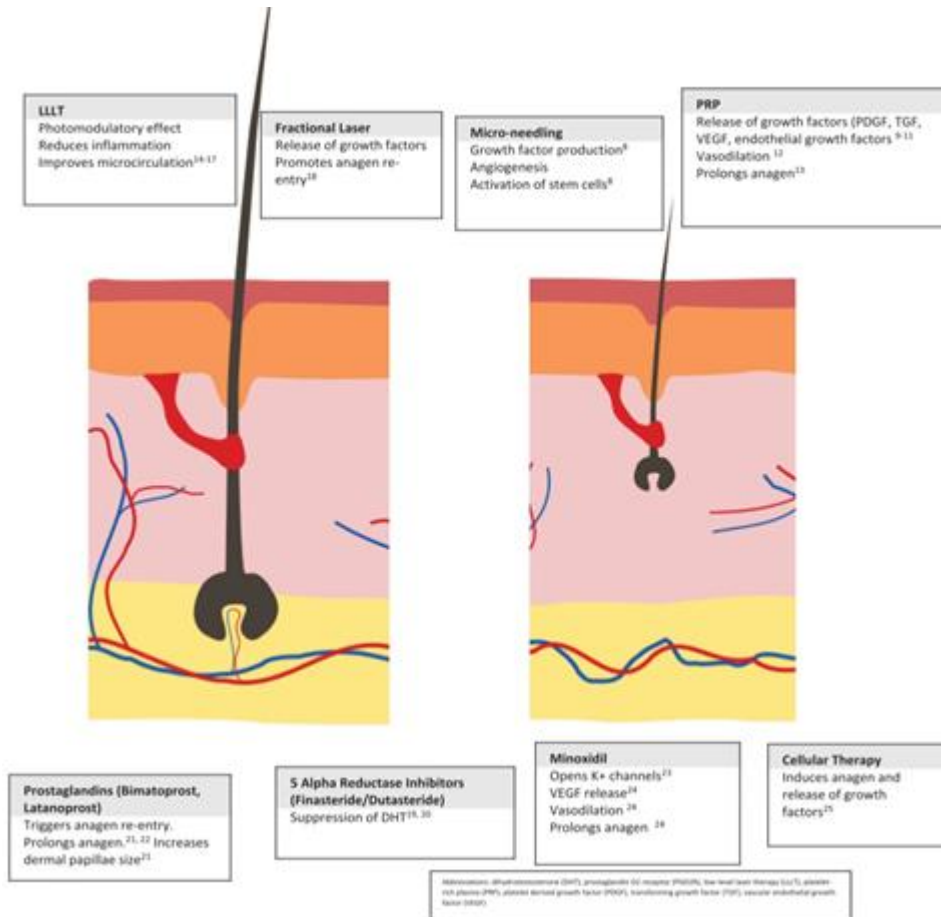
The growth factors found in platelets, such as platelet - derived growth factor (PDGF), transforming growth factor - beta (TGF - beta) and vascular endothelial growth factor (VEGF), are thought to stimulate the production of new hair by activating the stem cells in the hair follicles. These stem cells then differentiate into new hair cells, leading to the growth of new hair.<sup>7</sup>

PRP treatment also improves blood circulation in the scalp, which is important for hair growth. The increased blood flow delivers oxygen and nutrients to the hair follicles, which are essential for healthy hair growth. Additionally, PRP is thought to also have an anti - inflammatory effect on the scalp, which can reduce inflammation and improve the overall health of the hair follicles. This can help to prevent hair loss and promote the growth of new hair.<sup>8</sup> It is also believed that PRP can activate the Wnt signaling pathway, which plays an important role in hair growth. The Wnt signaling pathway is responsible for the activation of hair follicle stem cells and the formation of new hair follicles.<sup>7</sup>

The procedure typically takes about 30 minutes to an hour, depending on the area being treated. The patient may feel a slight discomfort during the injection, but it is generally well - tolerated. After the treatment, patients can resume their normal activities immediately. PRP treatment for hair loss is not a one - time treatment; it's usually a series of treatments that are done periodically to maintain the results. PRP therapy is not yet FDA approved for hair loss treatment. It is not a guaranteed treatment for hair loss and results may vary for each person.<sup>6</sup> Overall, the history and physical

examination are essential for the diagnosis and management of hair loss and should be performed by a qualified healthcare professional.<sup>2</sup> During the history, important points to be considered about the onset, duration and progression of the hair loss, as well as any associated symptoms. They should also be asked about any medical conditions, medications and recent life events that may have contributed to the hair loss. The information gathered during the history and physical examination will help the healthcare professional to determine the type and cause of the hair loss, which will guide the choice of treatment. Additional diagnostic tests, such as blood tests or a scalp biopsy, may also be performed to confirm the diagnosis or rule out other conditions.<sup>2</sup> The safety and clinical efficacy of autologous PRP injections for pattern hair loss were investigated.<sup>7</sup> Therapy depends upon the etiology and type of hair loss. Main aim of therapy is to improve hair density and seize miniaturization of hair follicles.

Other treatment includes oral treatment, hormonal treatment, laser therapy or surgery. Finasteride is an inhibitor of 5 alpha reductase type II enzyme, FDA approved for androgen dependent male pattern hair loss. It restricts the formation of DHT from testosterone. Some scarcely seen side effects include gynecomastia, reduced libido and erectile dysfunction.<sup>3, 9</sup> Minoxidil also leads to elevated expression of the vascular endothelial growth factor on the hair follicles along with activation of prostaglandin synthase - 1 which is an enzyme responsible for increased expression of hepatocyte growth factor (HGF) which is a hair growth stimulator. Hypertrichosis is one of the major side effects observed.<sup>3, 9</sup> Cyproterone acetate is one such example of hormonal treatment which has prime action through blocking of androgen receptor and inhibiting the action of gonadotropin - releasing hormone. Also used in combination with estradiol.<sup>9</sup> In laser therapy, light of wavelength 650 - 900 nm has proven to increased hair follicle growth. Studies are still in progress hence no correct mechanism of action is observed but is believed to penetrate the scalp resulting in initiation of production of reactive oxygen species levels thereby causing indirect gene activation and protein production useful for cell. Increased hair density and rate of hair growth has been improvised using laser comb.<sup>3</sup> Hair transplantation is one such alternative therapy adopted with promising hair coverage results. It acts by donor dominance principle.<sup>9</sup>



**Figure 2:** Treatment modalities for male pattern hair loss and proposed mechanism of action<sup>3</sup>

#### 4. Results

At the end of the 3 treatment cycles, the patients presented clinical improvement in the mean number of hairs. No side effects were noted during treatment. After 12 months, 4 patients reported progressive hair loss; this was more evident 16 months after the last treatment. Those four patients were re - treated.

##### Patient 1



Before treatment



After treatment



**Patient 2**

Before treatment



After treatment

**5. Discussion**

Male pattern hair loss is usually observed on the top and frontal portion of the head. It can be denoted as slow thinning of hair in a particular pattern owing to fluctuation in the amount of androgen.<sup>3</sup>As this condition is linked to imbalance in the level of androgen, occurrence can be seen immediately after puberty.<sup>3</sup>Hair growth in human follows a particular cycle which consists of major 3 phases: anagen phase (active phase - hair growth and replacement of old hair), catagen (transition from active to resting stage) and telogen (nogrowth, shedding).<sup>1</sup> Hair follicular miniaturization is the main indication of male pattern hairloss.<sup>3</sup>Male pattern baldness is a multifactorial disease with its prevalence being more in Caucasians and its severity may vary from one individual to another.<sup>9</sup>

A history and physical examination are important tools for a healthcare professional to use when assessing a patient with hair loss and suggesting them appropriate treatment. The physical examination will involve a thorough examination of the scalp, including the hair, hair follicles, and any areas of inflammation or infection. The healthcare professional will also examine other areas of the body, such as the nails, skin and endocrine organs, to look for signs of any underlying medical conditions that may be contributing to the hair loss. It is also important to consider the patient's family history, as sometimes it can be inherited.<sup>2</sup>

PRP has been investigated as a treatment for hair loss. PRP hair treatment is a non - surgical procedure that uses a patient's own blood to promote hair growth.<sup>6</sup>There is a growing body of research on its use in promoting hair growth. The efficacy of PRP for hair loss is still under investigation, with studies yielding mixed results. Some studies have found that PRP can be effective in promoting hair growth and improving hair density, while others have found no significant difference between the treatment and a placebo.<sup>7</sup> Additionally, there is a lack of consensus on the best protocols for administering PRP, such as the number of treatments needed, the frequency of treatments and the optimal concentration of platelets to use.<sup>7</sup>In terms of safety, PRP is generally considered to be a safe procedure with minimal side effects. The most common side effects reported are pain, itching, or swelling at the injection site, which are usually temporary. However, some rare cases of infection or allergic reaction have been reported.<sup>6</sup>

**6. Conclusion**

Male - pattern hair loss is not life threatening but needs proper management and evaluation to avoid complete baldness. As hair cycle is directly linked to Wnt signaling pathway for hair growth, hence any dysregulation due to any factors may cause patterned hair loss. Although use of topical drug can manage and rectify the condition, more faster and effective methods are needed for its treatment. PRP is considered as one such reliable alternative for the therapy.

In summary, PRP treatment for hair loss is a promising, non - surgical alternative with minimal side effects. It is an autonomous process in which platelet composition is elevated than normal baseline value along with 3 - 5 times more amounts of growth factor as compared to the normal whole blood, yet within the physiologic limits of plasma. PRP is thought to help hair growth by promoting the growth and differentiation of hair follicle stem cells. These stem cells then differentiate into new hair cells, leading to the growth of new hair. PRP is thought to also have an anti - inflammatory effect on the scalp, believed to activate the Wnt signaling pathway, which plays an important role in hair growth.

Our data clearly highlight the positive effects of PRP injections on male pattern hair loss and absence of major side effects. PRP may serve as a safe and effective treatment option against hair loss; more extensive controlled studies are needed. Also, it has been observed that PRP acts

synergistically with other topical applied drugs like finasteride and minoxidil for regeneration of hair.

**Conflicts of interest:** Nil

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