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Platelet-Rich Plasma Therapy for Hair Loss Treatment in North Bengal Medical College, Sirajganj, Bangladesh

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Abstract

Background: Platelet rich plasma (PRP) is a promising and novel therapy for the treatment of androgenetic alopecia. There are various growth factors in PRP which induce the proliferation of dermal papilla cells. Platelet-rich plasma (PRP) is an autologous preparation of platelets in concentrated plasma. Although the optimal PRP platelet concentration is unclear, the current methods by which there has been a lot of hype on the use of platelet rich plasma (PRP) for various dermatological indications including acne scarring, leg ulcers, facial rejuvenation, alopecia areata and androgenetic alopecia. Out of all the treatment modalities, platelet rich plasma shows promising results.

Objective: To assess the platelet-rich plasma therapy for hair loss treatment in North Bengal Medical College, Sirajganj, Bangladesh.

Methods: A randomised controlled trial was conducted in Dept. Of Dermatology, North Bengal Medical College, Sirajganj, Bangladesh from January 2020 to December 2022, on the efficacy of platelet rich plasma in 100 patients with patterned hair loss. We selected hundred cases of both male and female pattern hair loss for the study. Written informed consent of all the patients was taken before the start of the study.

Results: Total 100 patients included in our study. There were 84 males and 16 females and male: female was 5.2:1. Maximum number of patients (68%) were between 31 to 60 years of age, followed by 32 (32%) patients between 21 to 30 years of age. Very good improvement was seen in 32 (32%) patients, good improvement was seen in 48 (48%) patients, average improvement, was seen in 8 (8%) and poor improvement, was seen in 12 (12%) patients. Regarding the side effects of PRP, bruising was seen in 8 (8%), pain was seen in 12 (12%). After 4 months of treatment, average hair count increased by 40% and average hair shaft diameter increased by 56%.

Conclusions: PRP is a novel therapy, but is not an evidence-based therapy for the treatment of alopecia.

Keywords: Platelet Rich Plasma, Androgenetic Alopecia, Female Pattern Hair Loss, Centrifugation

Introduction

Platelet-rich plasma (PRP) is an autologous preparation of platelets in concentrated plasma. Although the optimal PRP platelet concentration is unclear, the current methods by which PRP is prepared report 300-700% enrichment, with platelet concentrations consequently increasing to more than 1,000,000 platelets/L^[1]. PRP has attracted attention in several medical fields because of its ability to promote wound healing. Androgenetic alopecia (AGA) is a psychologically distressing condition for both males and females and it leads to low self-esteem. Many therapeutic modalities are being tried for androgenetic alopecia in males and female pattern hair loss. There are various modalities for the treatment of AGA including topical minoxidil and oral finasteride. There has been a lot of hype on the use of platelet rich plasma (PRP) for various dermatological indications including acne scarring, leg ulcers, facial rejuvenation, alopecia areata and androgenetic alopecia. Out of all the treatment modalities, platelet rich plasma shows promising results. PRP has healing properties due to the increased concentrations of autologous growth factors and secretory proteins which help in the healing process^[2]. However, in general, the success rate of PRP hair treatment in India is typically high.

In fact, many global studies prove that PRP therapy is considered one of the most successful non-surgical hair loss treatment methods, with a success rate of 80-92 per cent in India. PRP is an autologous concentration of human platelets contained in a small volume of plasma and has haemostatic and tissue repairing effects [2, 3]. For the preparation of PRP, whole blood from the patient is first centrifuged to separate the plasma from packed red blood cells and then further centrifuged to separate PRP from platelet-poor plasma. This concentrate is then activated with the addition of thrombin or calcium, resulting in a gelatinous platelet gel. Clinically valuable PRP contains at least one million platelets per microliter. Lesser concentrations cannot be relied on to enhance wound healing. Activated PRP stimulates the proliferation and differentiation of stem cells in the hair follicle bulge area by various mechanisms [3, 4]. PRP Therapy is a non-surgical treatment that we can complete at our offices. During PRP Therapy, we take a small amount of your blood and isolate platelets and growth factors. The concentrated plasma is injected into the scalp, where it stimulates follicle repair and recovery while strengthening hairs. Your procedure can be completed in less than one hour. The procedure involves six treatments, scheduled at one treatment per month. New growth will typically occur after three to six months; it can take up to one year for a patient to see the maximum benefit of PRP Therapy, although many patients will see new growth sooner than this. Single booster treatments are recommended every 6 to 12 months to maintain optimal results.

Materials and Methods

A randomised controlled trial was conducted in Dept. Of Dermatology, North Bengal Medical College, Sirajganj, Bangladesh from January 2020 to December 2022 on the efficacy of platelet rich plasma in 100 patients with patterned hair loss. We selected hundred cases of both male and female pattern hair loss for the study. Written informed consent of all the patients was taken before the start of the study.

Inclusion criteria

All the male and female patients with patterned hair loss; patients who have not been on any other treatment modality during the past one year; patients having no other systemic disorder; patients not responding to topical and oral modalities were included in the study.

Exclusion criteria

Patients with unrealistic expectations and patients who are not on any antiplatelet or anticoagulant drugs were excluded.

The PRP preparation was done under aseptic precautions 20 ml of venous blood was drawn and added to a test tube containing acid citrate dextrose in a ratio of 9:1 (blood: acid citrate dextrose), centrifuged at 5000 rpm for 15 min to separate the red blood cells from the platelets and plasma. Double spinning method was used for centrifugation. Then the supernatant and the buffy coat composed of platelets and plasma was collected and centrifuged again at 2000 rpm for 5 to 10 min. The bottom layer about 1.5 ml was taken and

10% calcium chloride was added (0.3 ml for 1 ml of PRP). Total 2 to 3 cc of PRP was injected at each session. The platelet count in the PRP was done by automated cell analyzer. The interfollicular injections of PRP were given every month for a total of 4 sessions. 2 to 3 ml of PRP was injected into the scalp using the nappage technique. Nappage is a multi-pricking technique where 2 to 4 injections are made per second, every 2 to 4 mm apart at an angle of 30 to 60 degrees from the skin surface. The needle penetrates to a depth of 2 to 4 mm while constant unchanging pressure is applied to the piston of the syringe. Clinical photographs of the patients were taken at baseline and then after every visit. All patients were advised to avoid washing hair 2 days before the treatment. The "hair pull test" is performed 3 times by the same clinician. To evaluate overall hair growth, hair volume, hair quality, and fullness, global pictures are taken in every session from the front, vertex, lateral, and back view. Hair pull test was done in all the patients. 50 to 60 hairs were grasped between the thumb, index, and middle finger from the base close to the scalp and the extracted hair was counted in every session. The improvement was assessed by grading the patient according to physicians global assessment scale as follows [5]. Poor improvement was known when <25% restoration of hair growth, followed by average improvement i.e., 25% to 50% restoration of hair growth, good improvement 51% to 75% restoration of hair growth and very good improvement when >75% restoration of hair growth was observed.

After the procedure, the patients were instructed to refrain from any physical exercise or sunlight for 2 to 3 days. PRP was done at an interval of four weeks and a total of four sessions were done. Pre and post treatment photographs of the patients were taken. Follow up of patients was done for a period of 6 months. Any side effects experienced by the patients were noted. The data was analyzed using chi square test.

Results

Total 100 patients included in our study. There were 84 males and 16 females and male: female was 5.2:1. Regarding the age distribution (Table-1) of patients, maximum number of patients (68%) were between 31 to 60 years of age, followed by 32 (32%) patients between 21 to 30 years of age. The assessment of the patients was done both subjectively and objectively (Figure 1: A,B,C & Fig-2: A, B). The objective improvement of the patients (Table 2) was seen by physicians global assessment scale as follows-very good improvement was seen in 32 (32%) patients (Figure 1 and 1A), good improvement was seen in 48 (48%) patients (Figure 2 and 2A), average improvement was seen in 8 (8%) and poor improvement, was seen in 12 (12%) patients. Regarding the side effects of PRP (Table 3), bruising was seen in 8 (8%), pain was seen in 12 (12%).

Table 1: Age distribution of patients (N=100)

Age distribution	Number of patients	Percentage (%)
21-30	32	32.0
31-40	42	42.0
41-50	16	16.0
51-60	10	10.0

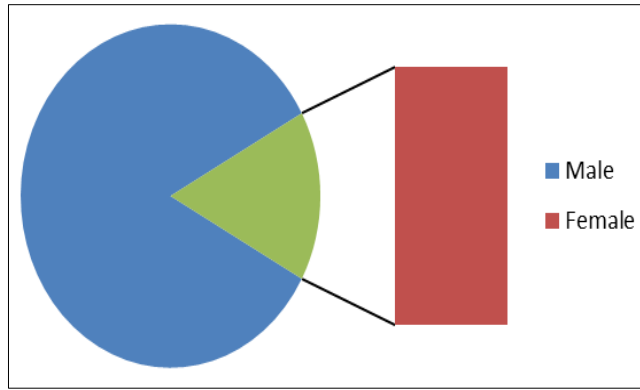


Fig 1: Sex distribution of PRP patients.



Fig-1: Pre and post treatment photograph in a 35 years old male before and after 3 sessions of PRP.



Fig-2: Pre and post treatment photograph in a 28 years old male before and after 3 sessions of PRP.

Table 2: Improvement of alopecia (N=100)

Grading of improvement	Number of patients	Percentage (%)
Very good	32	32.0
Good	48	48.0
Average	8	8.0
Poor	12	12.0

Table 3: Side effects of PRP therapy (N=20)

Side effects	Number of patients	Percentage (%)
Bruising	8	8
Pain	12	12

Discussion

Hair loss has a significant influence on psychological distress and is associated with low self-esteem and depression. Treatment options for androgenic alopecia are very limited and include topical minoxidil and oral finasteride (FDA approved) either alone or in combination [6, 7]. However, there are several reported side effects such as headache and increase in other body hairs for minoxidil [6]. PRP has already attracted attention in plastic surgery, orthopaedic surgery and cardiac surgery because of its potential use in skin rejuvenating effects, rapid healing, reduced infection, decreased chance of hypertrophic keloids and scars [8, 9]. Growth factors are known to activate the proliferative phase and trans differentiation of hair and stem cells and produce new follicular units. bFGF is reported to promote the in vitro proliferation of papilla cells, and thereby plays a key role in elongating hair shaft [10]. Total 100 patients included in our study. There were 84 males and 16 females and male: female was 5.2:1. Maximum number of patients (68%) were between 31 to 60 years of age, followed by 32 (32%) patients between 21 to 30 years of age. The assessment of the patients was done both subjectively and objectively. Subjective improvement was seen in all the patients including stoppage of hair fall and restoration of hair growth. The objective improvement of the patients (Table 2) was seen by physicians global assessment scale as follows- Very good improvement was seen in 32 (32%) patients (Figure 1A and 1B), good improvement was seen in 48 (48%) patients (Figure 2A and 2B), average improvement was seen in 8 (8%) and poor improvement, was seen in 12 (12%) patients. Regarding the side effects of PRP (Table 2), bruising was seen in 8 (8%), pain was seen in 12 (12%). After 4 months of treatment, average hair count increased by 40% and average hair shaft diameter increased by 56%. Overall satisfaction score of the patient was good with increased hair density and appearance. In a study by Ayatollahi et al., male patients with AGA Hamilton grade III to VI were studied [11]. Patients received five injections of 2 to 4 ml PRP by single spin process every 2 weeks. An evaluation was performed at baseline and 3 months after the last injection by standard photographs and hair density and diameter. The results revealed a decrease in anagen, increase in telogen, and decreased anagen/telogen ratio. But no difference in hair count or density was found. This was different from our study as hair count increased in our study. In our study, pain and discomfort were seen in 12 patients and bruising after PRP was seen in 8 patients. The most common side effect reported in a study by Kim et al. was temporary pain at the injection site [12]. No major adverse effects were reported. This data was similar to our study. All the samples were evaluated for the concentration of platelets before and after the procedure. Our method of PRP preparation was manual double spin method and platelet concentration reached was four to five times the normal value. The double-spin method was developed and produces a higher platelet concentration (>5 times whole-blood platelet concentration) with little to no red blood cells and neutrophils [13]. Platelet-rich plasma contains autologous growth factors, which could act synergistically with growth factors induced by skin needling in order to enhance the wound- healing response [14, 15]. Platelets, once activated, release several growth factors, cytokines, and chemokines. The beneficial effects of PRP in AGA can thus be attributed to various platelet derived

growth factors causing improvement in the function of hair follicle and promotion of hair growth [16, 17]. It is safe, cheap, and nonallergic. The mitogenic effects of PRP are only limited to augmentation of the normal healing process and is theoretically not mutagenic, as the growth factors released do not enter the cell or its nucleus, but only bind to the membrane receptors [18, 19]. Since PRP is an autologous preparation, it is devoid of any serious adverse effects, apart from local injection site reactions like pain or secondary infection, which can be avoided with proper precautions. PRP has no issues regarding transmission of infections such as hepatitis or HIV [20]. Various studies have been conducted on the efficacy of PRP in androgenetic alopecia. In a study by Lopez et al., an open labelled controlled study was done to assess the effect of PRP mesotherapy in AGA [21]. A total of 100 patients were taken up for the study and there was significant increase in hair density and borderline increase in hair number. In another study by Park et al., a split scalp comparison of PRP injections versus saline was done in an AGA patient and it resulted in significant increase in hair density and borderline increase in hair number [22]. But all said and done, PRP is still in the nascent phase and more multicentric trials need to be conducted to prove its efficacy in various disorders. Moreover, there was evidence showing that PRP can improve clinical symptoms in some types of cicatricial alopecia. However, further studies are needed to determine the standard of PRP treatment preparation, treatment regimen, including dosing protocols, injection technique, number and interval of optimal treatment sessions in order to achieve the maximum therapeutic efficiency.

Conclusion

To conclude, PRP is a safe procedure with minimal risks and side effects. Since it is an autologous preparation, the risk of allergy and infection is minimal. PRP injection for androgenic alopecia is a simple, cost-effective and feasible treatment option for hair loss and can be regarded as a valuable adjuvant treatment modality for androgenic alopecia. But in manual PRP it is important that complete aseptic precautions should be taken while handling the samples. Also, in manual PRP, temperature maintenance is very important as the potency of PRP decreases with increased temperature. More trials need to be conducted with larger number of patients. The role of PRP in restoring hair density leads to a better outcome for the treatment of male and female pattern hair loss. But, all said and done, it is not an evidence based therapy and larger studies need to be conducted to prove its efficacy.

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