

PLATELET RICH PLASMA IN ANDROGENIC ALOPECIA IN MALE AND FEMALE PATIENTS- A MYTH, A PROSPECTIVE STUDY

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ABSTRACT

BACKGROUND

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. 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. The treatment modalities are limited, mainly minoxidil, 5-alpha-reductase inhibitors and hair transplantation. Few treatment options and those too having side effects prompted the discovery of platelet-rich plasma (PRP).⁽¹⁾ The basic idea behind PRP injection is to deliver high concentrations of growth factors to the scalp with the hope of stimulating hair regrowth. PRP is an autologous preparation of platelets in concentrated plasma. Although, the optimal PRP platelet concentration is unclear, the current method by which the PRP is prepared reports 300 - 700% enrichment with platelets concentration consequently increasing to more than 1,000,000 platelets. PRP has attracted attention in several medical fields, because of its ability to promote wound healing.⁽²⁾ Activation of alpha granules of platelets releases numerous proteins including platelet derived growth factor (PDGF), transforming growth factor (TGF), vascular endothelial growth factor (VEGF) and interleukin (IL-1). It is hypothesised that growth factors released from platelets may act as a stem cell in the bulge area of the follicles stimulating the development of new follicles and promoting neovascularisation.

Aims and Objectives- This is uncontrolled clinical trial done to know the safety, efficacy and feasibility of PRP injections in treating androgenic alopecia in both male and female patterns hair loss.

MATERIALS AND METHODS

This study was uncontrolled clinical trial. A total of 32 patients were selected, out of which 18 patients suffering from hair loss due to androgenic alopecia (56%) and 14 cases of female pattern hair loss (44%) not responding to 6 months treatment with minoxidil and finasteride were included in the study. A total volume of 2 to 3 cc of PRP was injected in the scalp using an insulin syringe. The treatment was repeated every 2 weeks for a total of 4 times. The outcome was accessed after 3 months by clinical examination, by taking photos and doing hair pull test.

Study Setting- DVL Department, Andhra Medical College, King George Hospital, Visakhapatnam, Andhra Pradesh, India.

RESULTS

A significant reduction of hair loss was observed between 1st and 4th injection. There was significant improvement in the hair growth after 6th injection in 22 patients and hair pull test became negative in 13 of the above cases.

CONCLUSION

PRP is a single, cost effective and feasible treatment option for androgenic alopecia. In both male and female patterns, it showed good results.

KEY WORDS

Androgenic Alopecia, Male and Female Pattern, Platelet Rich Plasma, Hair Pull Test.

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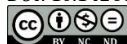
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BACKGROUND

Androgenic alopecia, a male pattern baldness is very common type of hair loss observed in both male and female. PRP is an autologous preparation of platelets in concentrated plasma. Although, the optimal PRP platelet concentration is unclear, the current method by which the PRP is prepared reports 300 - 700% enrichment with platelets concentration consequently increasing to more than 1,000,000 platelets. PRP has attracted attention in several medical fields, because of its ability to promote wound healing. Activation of alpha granules of platelets releases numerous proteins including platelet

derived growth factor (PDGF), transforming growth factor (TGF), vascular endothelial growth factor (VEGF) and interleukin (IL-1). It is hypothesised that growth factors released from platelets may act as a stem cell in the bulge area of the follicles stimulating the development of new follicles and promoting neovascularisation.

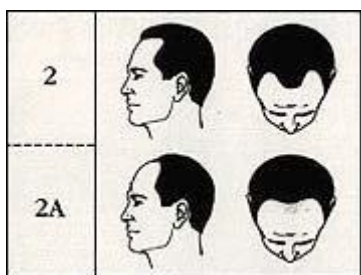
The aim of our study was to evaluate the safety, efficacy and feasibility of PRP for treatment of androgenic alopecia in both male and females by staging the patient based on Norwood-Hamilton scale and Ludwig classification respectively.

Norwood Hamilton Scale- Stage 1



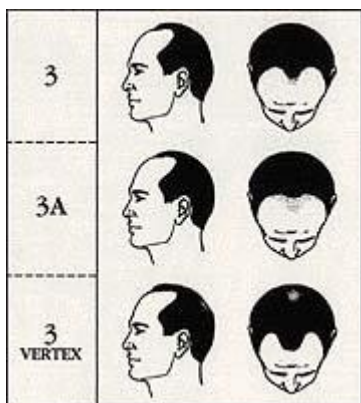
Very minor or no recession of the hair line, therefore no need for treatment. Unless you have a family history of baldness, there is no need to worry. If there is a family history of male baldness, you may want to monitor the situation closely and decide the appropriate time for treatment.

Norwood-Hamilton Scale- Stage 2



Triangular and typically symmetrical areas of recession at the front temporal area. Hair loss remains ahead of a line several centimetres in front of the ears. Hair falls and may become less dense in the central front part of the scalp. Initial signs of baldness are becoming evident.

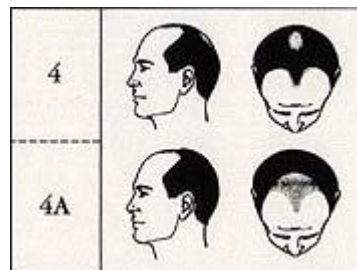
Norwood-Hamilton Scale- Stage 3



This represents the lowest extent of hair loss considered sufficient to be called baldness according to Norwood. Most scalps at this stage have deep symmetrical recession showing

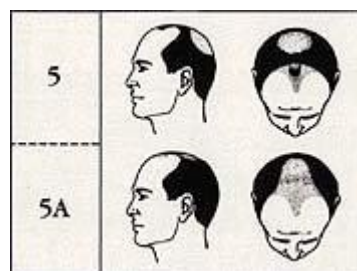
at the temples that are bare or only sparsely covered by hair. With stage 3 vertex, the crown is added since it is a common occurrence with age. Hair loss is primarily from the vertex with limited recession of the front temporal hairline.

Norwood-Hamilton Scale- Stage 4



Recession at the front temporal areas is more severe than stage 3. There is a decisive lack of hair on the crown. A band of moderately dense hair extending across the top separates the two areas of hair loss between front temporal and crown. This band bridges between the hair covered areas on the side of the head.

Norwood-Hamilton Scale- Stage 5



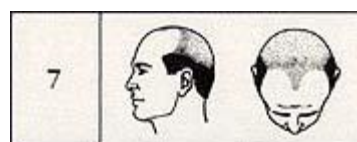
At stage 5 hair loss at the vertex region is still separated from the front temporal region, but the division is much less distinct. The band of hair extending across the crown is noticeably narrower and thinner. Hair loss at the vertex and front temporal regions are larger. When viewed from above, stages 5 to 7 show the remaining hair at the sides and back as a distinct horseshoe shape.

Norwood-Hamilton Scale- Stage 6



The bridge of hair that once crossed the crown has now been lost with only sparse hair remaining. The front temporal and vertex regions are now joined into one area. Hair loss on the sides has extended further.

Norwood-Hamilton Scale- Stage 7



This is the most advanced or severe form of hair loss. Only a narrow band of hair in a horseshoe shape survives on the sides and back of the scalp. This hair may be fine and less dense than before. At the nape of the neck, the hair is sparse with a semicircle over both ears.

The Ludwig Scale

The Ludwig Scale uses 3 different classifications or Types to diagnose the severity of female hair loss. From left to right in the image below, these types include Type I, Type II and Type III.



Type I

In this stage, hair loss is considered to be mild. Most women may have difficulty noticing that hair loss has occurred, as the frontal hairline remains relatively unaffected. Hair loss may occur on the top and front of the scalp, however. Such hair loss may be noticeable when the hair is parted down the centre of the scalp, as more and more scalp will become visible over time.

Type II

Type II hair loss is considered moderate. In this stage, women may notice each of the following: Thinning, shedding, general decrease in volume and a centre part that continues to widen over time. Depending on the severity, a hair transplant procedure may be a viable option for women who exhibit a Type II classification.

Type III

Type III is the final and most extreme classification of female hair loss. In this stage hair is so thin that it has difficulty camouflaging the scalp, rendering it visible to the naked eye. This may be worsened by a number of factors including hair miniaturisation, progressive thinning and extensive loss.

MATERIALS AND METHODS

It is uncontrolled clinical trial. The study was done in July 2014 and June 2015; all the patients suffering from androgenic alopecia and topical minoxidil and finasteride for at least 6 months without much improvement were considered for PRP therapy. Written informed consent was obtained. All included patients were tested for ELISA, for HIV, HBsAg and platelet count. Exclusion criteria were haematological disorders, thyroid dysfunction, malnutrition and other dermatological disorders contributing to hair loss. Sample size was taken conveniently.

A 1 cm to 1 cm square area was marked over right parietal area in the mid-pupillary line, 10 cm proximal to right eyebrow in each patient. Baseline follicular unit were manually counted with the help of dermascope.

Patient Evaluation

Before each session, the hair pull test was performed three times by the same clinician. All patients were advised to avoid washing hair 2 days prior to treatment. A bundle of approximately 50 to 60 hairs were grasped with thumb and index and middle finger from base close to the scalp. The hair was counted in each session. To evaluate overall hair growth, hair volume, hair quantity and fullness, pictures were taken in each session from front, vertex, lateral and back view.

PRP was prepared by collecting 20 cc of fresh blood in sodium citrate containing vacutainers in minor operation theatre under proper aseptic precautions. The tubes were rotated in a centrifuge machine 1500 to 2000 rpm, that is "soft spins" which allows blood separation into 3 layers, bottom RBC layer (55% of total volume), top most acellular plasma layer called platelet poor plasma (PPP) and 40% of total volume and an intermediate PRP layer of 5% of total volume called the "Buffy Coat." Separated Buffy coat with PPP was collected with the help of fine pipette in another test tube. This tube underwent a second centrifuge, which was longer and faster than the 1st called "hard" spin comprising 2500 rpm for 15 mins. This allows the PRP to settle at the bottom of the tube. The upper layer containing PPP was discarded and the lower layer of PRP was loaded in an insulin syringe containing calcium chloride (1 part calcium chloride and 9 parts of PRP) as an activator.

One hour prior to administration, PRP anaesthetic cream was applied over the bald area. Area of the scalp to be treated was cleaned with spirit and povidone-iodine. With the help of insulin syringe, PRP was injected over affected area by multiple small injections in a linear pattern 1 cm apart called (Nappage) technique under proper aseptic condition in minor operation theatre. A total volume of 2 to 3 cc was injected. The treatment was repeated for every 2 to 3 weeks for 4 sessions. At each visit, hair counts were noted. Subjective improvements of patients were noted. We evaluated all the patients at the end of 12 weeks.

Objectives of the Study

It is uncontrolled clinical trial done to know the safety, efficacy and feasibility of PRP injections in treating androgenic alopecia in both male and female patterns hair loss.⁽³⁾

Study Setting

DVL Department, Andhra Medical College, King George Hospital, Visakhapatnam, Andhra Pradesh, India.

Statistical Analysis

Data was analysed using SPSS Version 16.0. The Qualitative Data were expressed as numbers and percentages.

RESULTS

16 male patients in the age group of 25 to 50 years were included in the study. According to Hamilton classification of male pattern baldness 6 patients were in grade 2, 5 patients were in grade 3 and 4 patients were in grade 4 androgenic alopecia. Female pattern was also graded in 14 patients.

Before treatment, all our patients has a positive hair pull test in a mean number of 10 hairs. After 4th session, hair pull test was negative in 9 patients with an average number of three hairs. A significant reduction in hair loss was observed

between 1st and 4th injections as noticed by patients. Global pictures also revealed a moderate improvement in hair volume and coverage in 23 patients out of 30 patients.



Male Pattern Baldness before PRP



Female Pattern Baldness before PRP



Male Pattern Baldness after PRP



Female Pattern Baldness after PRP

Side effects after PRP injections were minimal pain, redness at the time of injection and pin point bleeding was observed.

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, either alone or in combination.^(4,5,6,7) However, there are several reported side effects such as headache and increased body hairs for minoxidil, whereas loss of libido has been reported with oral finasteride. Finasteride also interferes with genital development in a male foetus and is contraindicated in a pregnant woman and those likely to become pregnant.

PRP has already attracted attention in others like plastic surgery. Growth factors are known to activate the proliferative phase and trans-differentiation of hair and stem cells to produce new follicular units. VEGF is reported to promote in vitro proliferation of papilla cells and thereby plays a key role in elongating hair shaft.⁽⁸⁾

We prepared PRP by double spin method, in which blood cell layers were normally separated; activation of platelets through coagulation triggers the secretion of various growth factors which produce mitogenic effects in various cell types. Activated PRP promotes the proliferation of dermal papillary cells and prevents their apoptosis.

In our study, the hair pull test became negative after 4 sessions of PRP. This finding is comparable with the study conducted by Besti et al. This study also observed significant improvement in hair volume and coverage in global pictures, but according to our study moderate improvement in hair volume and coverage was observed.

Uebel et al observed a significant improvement in hair density and stimulation of growth when follicular units were pre-treated with platelet plasma growth factors before the implantation.⁽⁹⁾ There was significant difference in the yield of follicular unit on comparing with the experiments with the controlled areas of scalp.⁽¹⁰⁾ The areas treated with platelet plasma growth factors demonstrated a yield of 18.7 follicular units per square centimetres, whereas the control area yield 16.4 follicular units per square cm and increase in follicular density by 15.1%.

Our study has some limitations. Sample size is smaller. Mean follow-up of patients was also short to draw conclusion of long-term effective treatment.

CONCLUSION

PRP injections for androgenic alopecia was simple, cost effective and feasible treatment option for hair loss and can be regarded as a valuable treatment modality for androgenic alopecia.⁽¹¹⁾ Although, PRP has a sufficient theoretical and scientific basis to support its role in hair restoration. PRP is still in its infancy. Clinical evidence is still weak, considering its excellent safety profile and relatively low cost. PRP is a promising treatment option for patients with thinning of hair.

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