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The Efficacy of PRP Injection in Treating Androgenic Alopecia in Male and Female

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Abstract **Original Research Article**

Background: Androgenic alopecia (AGA) is a prevalent form of hair loss affecting millions worldwide, primarily influenced by genetic and hormonal factors. Platelet-Rich Plasma (PRP) injections have emerged as a promising therapeutic avenue for AGA treatment, offering hope to those facing hair loss. ***Objective:*** This study aimed to evaluate the effectiveness of PRP injections in treating AGA in both men and women. ***Methods:*** A prospective observational study was conducted at a tertiary hospital from June 2022 to June 2023. 30 patients with mild to moderate AGA were selected. PRP therapy was administered over three months, with regular assessments. Scalp examinations were conducted, and a control group received medical treatment without PRP. Contraindications for PRP therapy were noted. ***Results:*** The study group predominantly consists of individuals aged 25 to 40 years old, with 66.67% falling within the 25-34 age bracket and the remaining 33.33% in the 35-40 age group. Additionally, the incidence of hair fall is notably higher in males, comprising 96% of the total patients. Observations on the hair pull test before and after 12 weeks of Platelet-Rich Plasma (PRP) therapy for androgenic alopecia demonstrate a significant improvement in hair retention, with reductions in hair loss across all categories. Notably, 80% of participants observed new hair growth within just one week post-treatment, while the remaining 20% reported new hair growth taking longer than a week to become apparent. ***Conclusion:*** PRP injection presents a simple, cost-effective, and viable solution for AGA treatment. While further research is warranted to validate its efficacy, PRP therapy holds potential as a hopeful option for individuals experiencing hair loss.

Keywords: Androgenetic alopecia (AGA), Platelet-Rich Plasma (PRP) injections, Hair loss.

INTRODUCTION

Androgenic alopecia, commonly known as male and female pattern baldness, is a prevalent form of hair loss affecting millions worldwide. While it primarily manifests genetically, hormonal factors, such as androgens, play a pivotal role in its progression. As the quest for effective treatments continues, Platelet-Rich Plasma (PRP) injections have emerged as a promising therapeutic avenue, offering hope to those grappling with hair loss. This introduction explores the application of PRP injections in the treatment of androgenic alopecia in both men and women [1-3].

Androgenic alopecia represents a multifactorial condition characterized by progressive miniaturization of hair follicles, leading to a reduction in hair density and eventual baldness. In males, it typically manifests as a receding hairline and balding at the crown, while in females, it often presents as diffuse thinning over the crown and frontal scalp [4]. Despite its non-life-threatening nature, the psychosocial impact of androgenic alopecia can be profound, causing distress and undermining self-esteem.

Platelet-Rich Plasma (PRP) therapy has garnered attention as a minimally invasive treatment option for androgenic alopecia. PRP is a concentrated form of plasma enriched with platelets and growth factors obtained from the patient's blood [5]. When injected into the scalp, PRP is believed to stimulate hair follicle regeneration, prolong the anagen (growth) phase of the hair cycle, and counteract follicular miniaturization. Its autologous nature and low risk profile make PRP an attractive alternative to conventional treatments like topical minoxidil and oral finasteride, especially for individuals seeking naturalistic

approaches or those intolerant to systemic medications [6].

Numerous studies have investigated the efficacy of PRP injections in treating androgenic alopecia, yielding promising albeit variable results [7-9]. While some trials report significant improvements in hair density, thickness, and growth rates, others show more modest outcomes or fail to demonstrate superiority over placebo or standard treatments [10]. Discrepancies in study protocols, patient selection criteria, PRP preparation methods, injection techniques, and outcome measures contribute to the heterogeneity in findings, highlighting the need for further research to elucidate PRP's true therapeutic potential in androgenic alopecia management.

Objective

To evaluate the effectiveness of PRP injections in treating androgenic alopecia in both men and women.

METHODOLOGY

This prospective observational study was conducted at a tertiary hospital from June 2022 to June 2023 to assess the efficacy of Platelet-Rich Plasma (PRP) therapy in treating androgenic alopecia (AGA) in both males and females. PRP therapy was administered to individuals aged 18-70 years, who were in good general health and exhibited mild to moderate AGA.

After obtaining clearance from the hospital's ethical committee, the study commenced. 30 patients with both gender suffering from alopecia, were selected for the study. Following proper consent, they received PRP therapy over a period of three months, with their condition being assessed at regular intervals. Scalp examinations were conducted to rule out inflammation, erythema, or scarring.

Additionally, a control group comprising eight males and two females in the same age range received medical treatment without PRP. All participants were instructed to refrain from washing their hair two days prior to treatment. The "hair pull test" was conducted three times by the same clinician during each session to assess hair shedding. Global pictures were taken in every session from various angles to evaluate hair growth, volume, quality, and fullness.

It's worth noting that PRP therapy was contraindicated in certain cases, including patients who had undergone AGA treatments within the previous three months, individuals with a history of malignancies, platelet disorders, anemia, or bleeding disorders, pregnant or breastfeeding women, and patients with specific medical conditions or infections.

The preparation of PRP involved collecting fresh blood, separating it into layers through centrifugation, and extracting the platelet-rich plasma. The PRP was then activated with calcium chloride and prepared for injection into the affected areas of the scalp. Treatment sessions were repeated every two weeks for a total of four sessions, with patients being evaluated weekly throughout the treatment period.

RESULTS

The age distribution of the study group primarily comprises individuals aged 25 to 40 years old, with 66.67% falling within the 25-34 age bracket and the remaining 33.33% in the 35-40 age group.

Table-1: Age distribution of the study group

Age Group	n	%
25-34	20	66.67%
35-40	10	33.33%

The incidence of the hair fall is higher in males constituting 96% of total patients.

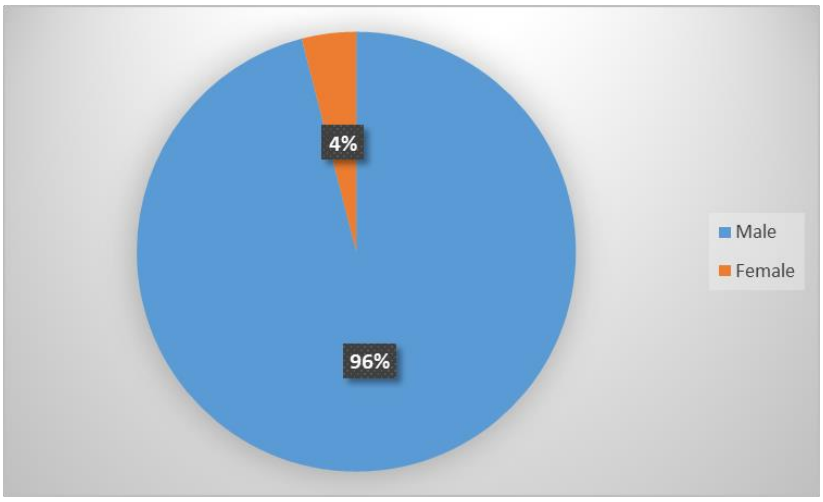

Figure-1: Gender distribution of the study group

Initially, 20% of subjects exhibited the pulling out of 2-3 hairs, which decreased to 45% after treatment. Notably, before treatment, 50% of subjects experienced the pulling out of 3-4 hairs, which was completely eradicated post-treatment. Similarly, instances of pulling out 5-7 hairs and more than 7 hairs were reduced from 15% each to 0% after PRP therapy. Strikingly, none of the subjects exhibited hair loss during the pull test after treatment, contrasting with the 55% who showed no hair loss before treatment.

Table-2: Observations on hair pull test in the ten subjects before and after 12 weeks of PRP in androgenic alopecia therapy

Number of hair pulled out	Hair pull test (Before)	Hair pull test (After)
2-3	**20%**	**45%**
3-4	**50%**	**0**
5-7	**15%**	**0**
>7	**15%**	**0**
None	**0**	**55%**

The timeframe for new hair growth post-treatment demonstrates rapid results, with 80% of participants observing new hair growth within just one week. The remaining 20% reported new hair growth taking longer than a week to become apparent.

Table-3: Weeks after new hairs are grown

Weeks after new hairs are grown	%
1 week	**80%**
>1 week	**20%**

Figure-2a and 2b: Before and after treatment results in study group

DISCUSSION

While the genetic underpinnings of androgenic alopecia (AGA) remain complex and elusive, significant strides have been made in unraveling its principal elements of androgen metabolism. Central to this understanding is the binding of dihydrotestosterone (DHT) to androgen receptors (AR), precipitating a cascade of DHT-dependent cellular functions reliant on the availability of weak androgens and their conversion into potent forms via five alpha-reductase [9-10]. Notably, the predisposed scalp demonstrates elevated DHT levels and heightened AR expression. Moreover, the conversion of testosterone to DHT within the dermal papilla assumes a pivotal role, with androgen-regulated factors originating from dermal papilla cells believed to modulate hair follicle growth [11]. While oral finasteride and topical minoxidil stand as established treatments targeting androgen metabolism and promoting hair growth, their clinical efficacy remains constrained, underscoring the possible contribution of sustained microscopic follicular inflammation and connective tissue remodeling to the intricate etiology of AGA.

The hair follicle, with its intricate biological architecture, undergoes a meticulously regulated growth process governed by distinct cycles. This cyclic transformation encompasses successive stages from anagen, characterized by active hair shaft production, to catagen, driven by apoptosis-induced regression, and finally to telogen, a resting phase culminating in hair follicle involution [12]. Apoptosis, orchestrated through the caspase cascade, orchestrates the transition from anagen to catagen, underscoring its pivotal role in hair cycle regulation. In this intricate dance of cellular dynamics, numerous growth factors serve as biological switches, orchestrating the transitions between phases and modulating apoptosis to induce catagen and telogen. Among the key players in hair follicle establishment are

vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), insulin-like growth factor 1 (IGF-1), and fibroblast growth factor (FGF). Platelets emerge as crucial contributors, releasing copious amounts of platelet-derived growth factor (PDGF), transforming growth factor beta (TGF-β), EGF, and VEGF, further enriching the milieu orchestrating hair follicle dynamics [13-14].

The efficacy of Platelet-Rich Plasma (PRP) in androgenic alopecia (AGA) can be attributed to the diverse platelet-derived growth factors (PDGFs) it contains, which contribute to enhanced hair follicle function and the promotion of hair growth. This therapeutic approach is notable for its safety, affordability, and lack of allergenicity, positioning it as a valuable adjunct in AGA management.

In a study it was reported that, pretreating follicular units with platelet plasma growth factors prior to implantation resulted in a significant improvement in hair density and growth stimulation. [15] Compared to control areas, regions treated with these growth factors exhibited a notable increase in follicular density, highlighting the efficacy of PRP in enhancing hair regrowth.

Optimal PRP platelet counts remain under investigation, yet concentrations exceeding 1 million/µL, approximately four to seven times the mean levels, are generally considered therapeutically effective. This underscores the importance of achieving a sufficiently high platelet concentration for optimal treatment outcomes.

Advancements in PRP therapy continue to emerge, with researchers exploring modifications to enhance its therapeutic efficacy. Another study investigated the use of low-molecular-weight heparin, [12] specifically dalteparin/protamine (DP), as a carrier for PRP. By adsorbing, stabilizing, and gradually releasing growth factors within PRP, DP demonstrated potential in further improving hair thickness without adverse effects, presenting a promising avenue for optimizing PRP treatment protocols.

CONCLUSION

Platelet-rich plasma (PRP) injection emerges as a straightforward, economical, and viable solution for androgenic alopecia-induced hair loss, presenting itself as a valuable complementary treatment approach. While PRP holds promise in hair restoration, its clinical application remains in its early stages, with limited empirical support. Despite this, its remarkable safety record and affordability position PRP hair treatment as a hopeful option for individuals grappling with thinning hair.

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