ISSN: 2584-0355
DOI: doi.org/10.51219/MCCRJ/Viktor-Kunder/21

URF PUBLISHERS
connect with research world

Medical & Clinical Case Reports Journal

https://urfpublishers.com/journal/case-reports

Vol: 1 & Iss: 2

Review Article

Platelet-rich Plasma's Effects in Patients with Androgenetic Alopecia: A Scoping Review

Viktor Kunder*, Cristina Munoz, Judd Ivan Palonpon

Osteopathic Medicine, Nova Southeastern University Dr. Kiran C. Patel College of Osteopathic Medicine, Fort Lauderdale, USA

Citation: Kunder V, Munoz C, Palonpon JI. Platelet-rich Plasma's Effects in Patients with Androgenetic Alopecia: A Scoping Review. *Medi Clin Case Rep J* 2023;1(2):72-76. DOI: doi.org/10.51219/MCCRJ/Viktor-Kunder/21

Received: 07 September, 2023; **Accepted:** 12 September, 2023; **Published:** 15 September, 2023

***Corresponding author:** Viktor Kunder, Osteopathic Medicine, Nova Southeastern University Dr. Kiran C. Patel College of Osteopathic Medicine, Fort Lauderdale, USA, Email: vk223@mynsu.nova.edu

A B S T R A C T

Androgenetic Alopecia (AGA), the most common form of hair loss in both males and females, is characterized by the progression of large, pigmented terminal hair to thin, fine vellus hair. In recent years, there has been growing interest in exploring Platelet-Rich Plasma (PRP) as a therapeutic option for AGA. PRP is a mixture of numerous cytokines and growth factors that have shown the ability to facilitate wound healing and collagen development. PRP is a mixture of numerous cytokines and growth factors that have shown the ability to facilitate wound healing and collagen development. Utilizing the databases PubMed, Medline EBSCO, and CINAHL, a comprehensive search was performed to identify studies that demonstrated whether PRP is effective in treating androgenic alopecia by increasing the hair density, thickness, or width of the area. We included studies published from 2016 to 2023 based on the inclusion criteria as follows: as follows: (1) adults 19+ years of age, (2) fully accessible texts, (3) English language (4) published between 2016-2023, (5) androgenic alopecia (6) controlled with a saline injection group, (7) articles on human subjects. The results showed a statistically significant increase in hair density with the PRP treatment compared to baseline. However, when compared to the placebo, most studies were insignificant. These studies also showed improvement in hair diameter or caliber. The current data involving randomized controlled trials (RCTs) is limited and further RCTs need to be performed to establish a correlation.

Keywords: Androgenetic alopecia; Platelet-rich plasma; Randomized controlled trials

Introduction

Androgenetic Alopecia (AGA), the most common form of hair loss in both males and females, is characterized by the progression of large, pigmented terminal hair to thin, fine vellus hair[1,2]. It affects over 80% of men and 50% of women during their lifetime with the prevalence increasing with age[3]. Various factors have been implicated in the pathogenesis including hormonal status, genetic predisposition, inflammation and altered signaling pathways[4]. Hair growth begins within a structure called a hair follicle. It undergoes a series of developmental phases, including the anagen phase (proliferation), catagen phase (involution), and the telogen phase (resting). In AGA, hair follicles may become inactive due to loss of stem cells in the bulge region alongside progressive hair follicle miniaturization and anagen phase shortening[5,6].

Hair loss due to AGA has been known to cause negative psychosocial effects including depression and anxiety. Moreover, hair loss decreases one's self-esteem, interpersonal relationships and even social status[1,4]. This has led to hair loss becoming one of the most common complaints for patients visiting a dermatologist[3]. Many investigations have taken place trying to determine a solution to stop hair loss and promote hair growth. Researchers soon discovered that the hair growth cycle can be stimulated by external factors including cytokines and growth factors[4]. Current methods of hair loss treatment include topical minoxidil, finasteride, dutasteride, and topical ketoconazole. Additionally, the use of hormonal therapy, laser therapy, and surgical options have been used[1]. Unfortunately, these options have yielded varying results of hair growth for patients and even when effective they function to maintain existing hair with

limited effect on hair restoration. Limited efficacy, combined with common side effects such as impotence, scalp irritation and hypertrichosis, have led to minimal overall success for current treatments[4].

In recent years, there has been growing interest in exploring Platelet-Rich Plasma (PRP) as a therapeutic option for AGA. PRP is a mixture of numerous cytokines and growth factors that has shown the ability to facilitate wound healing and collagen development[3]. PRP is currently being used in a wide variety of fields including dental restoration, maxillofacial surgeries, diabetic foot ulcers, osteoarthritis, acne scar treatment, and lipid transplantation[3]. PRP is also said to promote hair growth by stimulating stem cells within the bulge region of the follicle to activate the proliferative phase of the growth cycle[7,8]. Additionally it promotes neovascularization, extracellular matrix remodeling, and stem cell recruitment, chemotaxis, and proliferation[9].

By conducting a systematic review, this study aims to analyze the current literature on the effect of PRP in the management of AGA. An evaluation of various controlled clinical trials of patients with AGA using PRP as a method of hair growth and restoration will determine the overall efficacy of this growing therapeutic option. Ultimately, the findings of this review can help guide and improve the management of individuals with AGA.

Materials & Methods

A comprehensive search utilizing the databases PubMed, Medline EBSCO, and CINAHL, was performed to identify studies that demonstrated whether PRP is effective in treating androgenic alopecia by increasing the hair density, thickness, or width of the area. We included studies published from 2016 to 2023 based on the inclusion and exclusion criteria described below. The selection process was performed independently by three reviewers based on the inclusion and exclusion criteria.

Search Strategy

The inclusion and exclusion criteria were established prior to performing the review. The inclusion criteria were as follows: (1) adults 19+ years of age, (2) fully accessible texts, (3) English language (4) published between 2016-2023, (5) androgenic alopecia (6) controlled with a saline injection group, (7) articles on human subjects. Articles published before 2016, those without a control group with saline, or those involving hair loss from a disease other than androgenic alopecia were excluded. The search was conducted in April 2023 and yielded 127 results.

Identification of Studies

We used the following text words and search phrases in our search: ((Platelet-rich plasma) OR (PRP)) AND ((hair growth) OR (hair loss) OR (hair regrowth) OR (alopecia)).

Data Extraction

After screening and applying the inclusion criteria to the studies obtained from the relevant databases, all researchers organized the information on a data log that included the title, type of review and year, inclusion/exclusion criteria, sample size and age, limitations, methods, and results on a Google Docs spreadsheet. Then a thorough discussion of each article was conducted to determine whether it fulfilled the requirements related to quality and fit the inclusion criteria. Disagreements were resolved through discussion.

The initial search elicited 127 articles based on the outlined search criteria. After removing 19 duplicates, an additional 71 were filtered out as they involved variables that were outside of the inclusion criteria or did not have a saline control group. Once the screening process was over, the remaining articles underwent a quality assessment process, whereby 29 articles that did not match the inclusion criteria were removed. The final articles that were selected involved studies that involved hair loss in the androgenic pattern and had a saline control group (**Figure 1**).

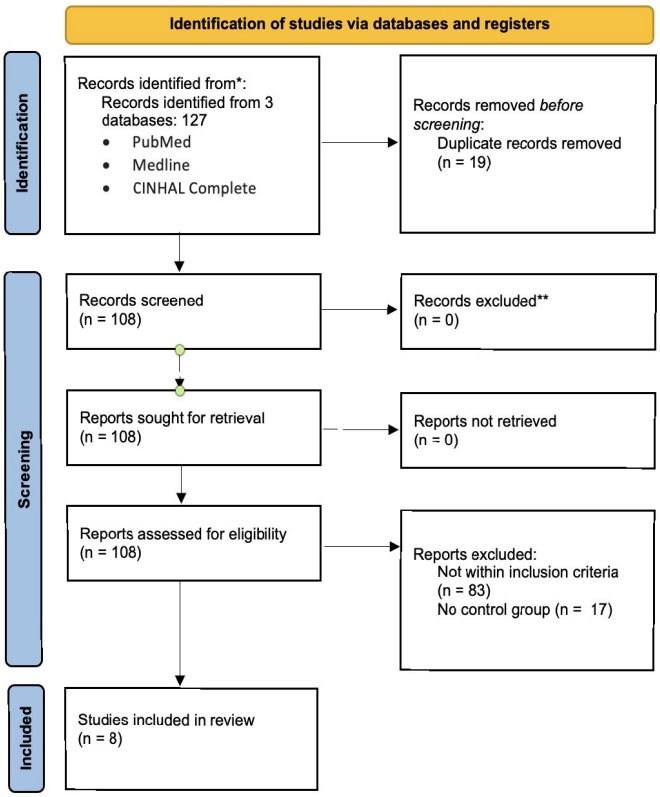

Figure 1: PRSIMA Flow diagram depicting the study flow process. PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

Results

A total of 8 articles were identified using the study selection process illustrated in (**Figure 1**). (**Table 1**) summarizes the characteristics of the studies included in this scoping review.

Author	Sample Size (N)	Frequency	Methods	Key Findings
Alves et al., 2016[1]	22	Once a month for three months.	Half of their head was injected with saline, and the other half with PRP. Results were recorded at 3 and 6 months.	PRP showed a statistically significant and positive effect on hair density but not hair count per square metric unit at 3 and 6 months. PRP group showed an increase in the hair anagen phase and a decrease in the telogen phase at 3 and 6 months. This was not significant when compared to the placebo.

Chuah et al., 2023 [2]	50	Total of four treatments, four weeks apart	PRP was injected in half of the scalp while saline was injected in the other half. Results recorded at 12 and 24 weeks.	PRP among all the participants resulted in an increase in hair density in both groups, however, there was no significant difference between the placebo versus the PRP group. Males had no significant change in hair diameter with PRP but a progressive decrease in the study.
Abeer et al., 2018[3]	30	Weekly sessions for four weeks.	Patients measured 6 months after their last injection N = 15 (PRP) N = 15 (control)	At 6-month follow-up, the PRP group yielded a significant increase in hair density and thickness versus baseline, while the saline group did not. Greater patient satisfaction for patients recieving the PRP treatment.
Greesenberger et al., 2020[4]	28	Injected at 4-6 week intervals.	Follow-up examinations at 4 weeks and 6 months after last treatment N = 19 (PRP) N = 9 (control)	The difference in hair number per square centimeter at the 2nd follow-up points was not statistically significant. The difference in hair diameter at the 2nd follow-up points was not statistically significant. Using the 5-point Likert Scale, visual improvement was not seen to be statistically significant between the 2 groups. Compared to the control group, the verum group was more likely to subjectively notice a positive change, more likely to pay for the treatment, and would recommend the treatment to other individuals.
Rodrigues et al., 2019[5]	2	4 total injections	Measured results 15 days and 3 months after last injection N = 13 (PRP) N = 13 (saline)	The PRP group showed a significant increase in hair count and density 3 months after PRP application, compared to the control group which did not have a significant increase. The anagen phase was increased during the 15-day checkup following the last treatment but was not at the 3-month follow-up.
Siah et al., 2020[6]	10	3 total injections	Measurements were recorded at baseline, 4 weeks, and 8 weeks after the final injection. All the patients had a placebo area that was not treated.	Hair growth densities were higher than observed at baseline (increased by 12.7% for the verum group and 0.96% for the control). Hair diameter decreased when compared to baseline (16.22% in the verum group and 19.46% in the control).
Shapiro et al., 2020[7]	35		Evaluated 3 months after their final treatment. All participants had square tattooed onto their scalps and compared the different modalities for a total of 3 months of treatments.	Hair density was significantly increased at each visit compared to baseline (increased 13%), however, the increase was not significantly significant when compared to the placebo group. Both the PRP and control areas increased in hair diameter compared to the baseline, however, the difference between the two groups was not significant. The visual assessment showed a 33% increase in the number of participants who showed slight or moderate improvement in the PRP group versus the placebo. Most patients did not have the impression that hair growth quality, or strength had changed, but 45.8% of subjects reported increased scalp coverage with hair. 86% of subjects would maybe or definitely recommend the treatment.
Dubin et al., 2020[8]	28	Once per month for a total of 3 months.	Evaluated at 24 weeks. N = 14 (PRP) N = 14 (saline)	Measuring categorical evaluation at 24 weeks compared to baseline, 93% of PRP patients had improvement in hair density score compared to 0% of saline patients. Also, the categorical evaluation showed a mean caliber increase of 57% in the PRP patients from baseline compared to 7% of saline patients.

Multiple studies showed a statistically significant increase in hair density with the PRP treatment compared to baseline[1-3,5-7,9]. Of these studies, when compared to the placebo rather than baseline, multiple were insignificant[2,5,7]. These studies also showed improvement in hair diameter or caliber[3,7,9]. There were also studies that showed no correlation to the control or baseline in either hair density, diameter, visual appearance[4,6].

Hair density

Seven of the eight studies in our review showed an increase in hair density to some degree compared to baseline[1-3,5-7,9]. However, of

these studies, only a few were statistically significant compared to the placebo[1,3,9]. In these studies, the placebo group showed an increase in density.

Hair caliber

Three of the eight studies showed how PRP could also increase the diameter of the hair follicle[3,7,9]. With this said, although one study increased the hair density, it also found to decrease the diameter of the follicle in both the treatment and placebo groups[2,6].

Anagen and telegen phase

Two of the studies showed that recent exposure to PRP increased the anagen phase while decreasing the telogen phase[1,5]. This effect was not apparent several months after the treatment[5].

Subjective responses

The three studies that measured subjective response to treatment were all positive in the group receiving treatment as opposed to the placebo[3,4,7]. Of these studies, most reported feeling more hair growth, however, despite one study not reporting increased hair growth, they were still satisfied and were more likely to recommend it to a friend[4].

Discussion

The effectiveness of PRP treatments for hair loss has been a subject of significant interest and research in recent years. While the precise mechanisms remain not entirely understood, several factors contribute to the potential effectiveness of PRP in hair restoration. These include the presence of growth factors within platelets, such as platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF-β), and vascular endothelial growth factor (VEGF), which are believed to promote hair follicle growth, extend the anagen (growth) phase of the hair cycle, and stimulate hair follicle cell proliferation.

Additionally, PRP contains bioactive proteins and cytokines with regenerative properties, supporting tissue repair and stimulating the regeneration of damaged hair follicles. PRP may also stimulate angiogenesis, the formation of new blood vessels in the scalp, enhancing blood circulation to the hair follicles. This improved blood flow delivers essential nutrients and oxygen to the follicles, thereby promoting hair growth and preventing further hair loss. Furthermore, PRP exhibits anti-inflammatory properties, potentially reducing scalp inflammation associated with hair loss conditions, thereby creating a more conducive environment for hair growth.

Clinical studies on the efficacy of PRP treatments for hair loss have yielded varied results. Some studies have reported positive outcomes, including increased hair density, improved hair thickness, and enhanced hair growth in patients who underwent PRP treatments. However, other studies have presented more modest or inconclusive results.

It is important to recognize that individual responses to PRP treatments can vary, with effectiveness depending on factors such as the underlying cause of hair loss, the stage of hair loss, and the overall health of the patient. The number and frequency of PRP sessions, as well as the injection technique, may also influence treatment outcomes. Typically, PRP treatments for hair loss are administered as a series of sessions spaced several weeks apart. The precise protocol and treatment plan should be determined by a qualified healthcare professional or a specialist in hair restoration.

To assess the effectiveness of PRP in treating androgenetic alopecia and its impact on hair density, thickness, or width, a comprehensive search was conducted using databases such as PubMed, Medline EBSCO, and CINAHL. We selected studies for inclusion based on the following criteria: (1) participants aged 19 years and older, (2) fully accessible texts, (3) English language, (4) publication between 2016 and 2023, (5) focus on androgenetic alopecia, (6) inclusion of a control group receiving saline injections, and (7) studies involving human subjects.

In this scoping review, randomized controlled trials (RCTs) were employed to investigate the existing literature on the utilization of PRP for the treatment of androgenic alopecia. While the literature did reveal certain findings such as heightened hair density, increased hair caliber, and extended anagen phase when compared to baseline measurements, the majority of the articles did not demonstrate such improvements when compared to a placebo group. Despite the absence of a clear correlation in these aspects, there was a positive subjective response observed when compared to baseline measurements. However, it is important to note that the current body of evidence from RCTs in this area remains limited, with only eight articles meeting the inclusion criteria. Further research endeavors are warranted to establish whether a definitive correlation exists in this field. The findings indicated a statistically significant increase in hair density following PRP treatment when compared to baseline measurements. However, in most comparisons with a placebo group, the results from these studies were not statistically significant. Additionally, these investigations demonstrated improvements in hair diameter or caliber. It is worth noting that the current available data from randomized controlled trials (RCTs) is limited, and further RCTs are warranted to establish a conclusive correlation.

Conclusion

This scoping review methodology used RCTs to explore the current literature regarding the use of PRP in treating androgenic alopecia. Although the literature may have shown an increase in hair density, hair caliber, and increased anagen phase compared to baseline, most of the articles did not show an increase compared to the placebo group. Despite a lack of correlation, there was a positive subjective response compared to the baseline. The current data using RCTs are limited in this topic as only eight articles fit the inclusion criteria. Further research needs to be done in this field to determine whether a correlation exists.

Conflicts of Interest

This study does not have any conflict of interest.

References

1. Torabi P, Behrangi E, Goodarzi A, Rohaninasab M. A systematic review of the effect of platelet-rich plasma on androgenetic alopecia of women. Dermatol Ther 2020;33(6):e13835.

2. Katzer T, Leite Junior A, Beck R, da Silva C. Physiopathology and current treatments of androgenetic alopecia: Going beyond androgens and anti-androgens. Dermatol Ther 2019;32(5):e13059.

3. Mahmoud Makki, Younes AKH, Salah I. Evaluation of the effect of autologous platelet-rich plasma on androgenic alopecia. J Cosmet Laser Ther 2020;22(5):190-194.

4. Qu Q, Shi P, Yi Y, et al. Efficacy of Platelet-rich Plasma for Treating Androgenic Alopecia of Varying Grades. Clin Drug Investig 2019;39:865-872.

5. Butt G, Hussain I, Ahmed FJ, Choudhery MS. Efficacy of platelet-rich plasma in androgenetic alopecia patients. J Cosmet Dermatol 2019;18(4):996-1001.

6. Khademi F, Tehranchinia Z, Abdollahimajd F, Younespour S, Kazemi-Bajestani SMR, Taheri K. The effect of platelet rich plasma on hair regrowth in patients with alopecia areata totalis: A clinical pilot study. Dermatol Ther 2019;32(4):e12989.

7. Pakhomova EE, Smirnova IO. Comparative Evaluation of the Clinical Efficacy of PRP-Therapy, Minoxidil, and Their Combination with Immunohistochemical Study of the Dynamics of Cell Proliferation in the Treatment of Men with Androgenetic Alopecia. Int J Mol Sci 2020;21(18):6516.

8. Mercuri SR, Paolino G, Di Nicola MR, Vollono L. Investigating the Safety and Efficacy of Platelet-Rich Plasma (PRP) Treatment for Female Androgenetic Alopecia: Review of the Literature. Medicina 2021;57(4):311.

9. Bayat M, Yazdanpanah MJ, Hamidi Alamdari D, Banihashemi M, Salehi M. The effect of platelet-rich plasma injection in the treatment of androgenetic alopecia. J Cosmet Dermatol 2019;18(6):1624-1628.