Efficacy of Platelet-Rich Plasma (PRP) Injections vs Topical Minoxidil in Adults with Androgenetic Alopecia

Yuan-Jane Qiu, MMS, PA-S
Michael Huber, MMS, PA-C, DFAAPA
Department of Medical Science
ARCADIA UNIVERSITY
FOUNDED 1853

Abstract

- Androgenetic alopecia is a condition mediated by androgen (specifically DHT) and genetic factors causing hair loss and thinning of the scalp in men and women
- Topical minoxidil (Rogaine) is the most commonly used medication for AGA that stops hair loss and helps regrowth. However, it can cause an allergic reaction and its efficacy relies on the patient's compliance
- Platelet-rich plasma injections for AGA is becoming more widespread as a safe, non-allergic alternative with little to no side effects

Introduction

- Androgenetic alopecia is the most common form of alopecia, affecting up to 50% of women and 80% of men during their lifetime
- Women are affected the most following menopause
- >50% of men over 50 have some degree of hair loss which increases in severity with age
- While considered a cosmetic concern, hair loss can pose a significant threat to a person's emotional and psychological wellbeing as well as their overall quality of life
- Currently there is no cure and there are only two FDA approved treatment options
    - Minoxidil is believed to stimulate hair growth by shortening the telogen phase of the hair cycle and prolonging the anagen phase
    - Finasteride treats AGA by regulating/inhibiting the production of an androgen called dihydrotestosterone (DHT)
- The efficacy of these 2 medications varies greatly amongst individuals, requires daily-lifelong compliance, takes months to show noticeable results and can also be associated with the unfortunate side effect of sexual dysfunction in men (oral finasteride) as well as local irritation, allergic contact dermatitis and hypertrichosis (topical minoxidil
- PRP is an autologous concentration of platelets in plasma collected from the patient's own blood through centrifugation. The platelets are rich in growth factors which promote hair growth by acting on stem cells of the hair follicles and stimulating neovascularization
    - If platelet-rich plasma (PRP) injections reduce hair loss and promote hair regrowth more effectively in comparison to topical minoxidil

Methods

- A literature search was performed in September 2019 via Google Scholar and Pubmed using the terms "PRP" AND "minoxidil" AND "androgenetic alopecia". The search was limited to articles published since 2015
- Exclusion criteria: 1) Studies that included use of finasteride; 2) Studies that that were specific to a racial or ethnic group; 3) Studies that included patients with alopecia other than AGA such as alopecia areata, totalis, universalis, etc.
- Inclusion criteria: 1) Studies that included both men and women; 2) Studies that compared PRP and minoxidil as monotherapies rather than PRP as an adjuvant therapy

Results

Table 1. Comparison of study designs. PRP vs Minoxidil Monotherapy

Study	Design	Population	Duration	PRP Group Method	Minoxidil Group	Outcome Measure
Navarro et al.	Retrospective case control study	Total #: 379 245 women 134 men	4 months	PRP monotherapy; 18 cm^3 of blood drawn, sodium citrate anticoagulant, PRGF activator, 3-4 cm^3 PRGF inj monthly x 2 months (2 sessions)	Topical minoxidil 3% QD x 4 months	Global photographs, standardized trichograms
Starace et al.	Not-randomized, single group, single-center pilot study	Total #: 10 10 women	24 weeks (6 months)	PRP monotherapy; 10 mL of blood drawn, acid-citrate-dextrose anticoagulant, 5 mL PRP inj biweekly x 8 weeks (4 sessions)	Topical minoxidil 2-5% x at least 1 year	Global photographs, standardized trichograms, hair-pull test
Verma et al.	RCT	Total #: 30 30 men	6 months	PRP monotherapy; 25-35 mL of blood drawn, sodium citrate anticoagulant, calcium gluconate activator, 0.1-0.2 mL per inj monthly x 4 months (4 sessions)	Topical minoxidil 5% BID x 6 months	Global photographs, patient standardized hair growth questionnaire, patient satisfaction score, hair-pull test, platelet count
Vaaruni et al.	RCT	Total #: 60 60 women	6 months	Topical minoxidil 2% q12h x 6 months + PRP; 10 mL of blood drawn, calcium chloride activator, 1 mL inj q15d x 2 months then monthly x 4 months (8 sessions)	Topical minoxidil 2% q12h x 6 months	Global photographs, patient's self-assessment, physician's assessment, DLQI
Shah et al.	RCT	Total #: 50 50 men	6 months	Topical minoxidil 5% BID x 6 months + PRP w/ microneedling; 0.05 mL per inj monthly x 6 months (6 sessions)	Topical minoxidil 5% BID x 6 months	Global photographs, patient's self-assessment, physician's assessment, platelet count
Herakal et al.	RCT	Total #: 50 50 men	18 months	PRP w/ microneedling; 10 mL of blood drawn, inj twice per month x 6 months (12 sessions)	Microneedling twice per month + topical minoxidil 5% QD x 6 months	Global photographs, standardized trichograms, hair-pull test

Key: RCT = randomized controlled trial; DLQI = dermatological life quality index

Table 2. Validity assessment. PRP vs. Topical minoxidil

Study	Adequate timeline (> 6 months)	Adequate Sample Size (> 50)	Adequate Diversity (inclusion of women)	Intention to Treat Analysis	Adequate PRP Prep/Method	Adequate Outcome Measure/Reproducibility
Navarro et al. (PRP monotherapy)	M	A	A	A	A	A
Starace et al. (PRP monotherapy)	A	I	M	A	A	A
Verma et al. (PRP monotherapy)	A	I	I	A	A	A
Vaaruni et al. (Topical minoxidil 2% + PRP)	A	A	M	A	A	M
Shah et al. (Topical minoxidil 5% + PRP)	A	A	I	A	M	M
Herakal et al. (PRP w/ microneedling)	A	A	I	A	M	A

Key: A = adequate, M = marginal, I = inadequate evidence
-Adequate PRP Prep/Method = Full description of volume of blood drawn, PRP anticoagulant/activator used, PRP volume injected, injection frequency & # of sessions
-Adequate Outcome Measure/Reproducibility = Global photography w/ reproducible technique, use of trichoscopic analysis and/or hair-pull test

Table 3. Summary of results. PRP vs. Topical minoxidil

Study	Global Photography Total	Global Photography Volume/Density	Global Photography Quantity
Navarro et al. (PRP monotherapy)	S	S	S
Starace et al. (PRP monotherapy)	S	S	S
Verma et al. (PRP monotherapy)	S	S	S
Vaaruni et al. (Topical minoxidil 2% + PRP)	S	S	S
Shah et al. (Topical minoxidil 5% + PRP)	S	S	S
Herakal et al. (PRP w/ microneedling)	NS	NS	NS

Key: S = significant, NS = not significant

Discussion

- 3 studies directly compared PRP monotherapy to topical minoxidil monotherapy
    - Direct comparison; statistically significant
- 2 studies compared topical minoxidil in conjunction with PRP to topical minoxidil monotherapy
    - Indirect comparison; statistically significant
- 1 study compared PRP with microneedling to topical minoxidil with microneedling
    - Direct comparison; statistically insignificant
- Limitations
    - Each study had varying methods of PRP preparation and injection methods (volume of blood drawn, type of anticoagulant and activator, minimum platelet count, injection depth & technique)
    - Short duration of studies (studies ranged from 4 months to 18 months; 4 studies had a duration of 6 months)
    - Small sample size (sample sizes ranged from 10 to 379; 4 studies had a sample size of 50 or greater)
    - Lack of gender diversity (3 studies had an all-male population; 2 studies had an all-female population; only 1 study included both men and women)
    - Irreproducible global photography (lighting, angle and hair parting of progress photos differed from baseline photos)

Conclusion

- Due to its autologous nature, PRP circumvents the side effects associated with current FDA approved medications (minoxidil and finasteride)
- PRP is a much easier treatment plan to adhere to; injections are once monthly and are administered by a physician, PA or NP
- Further research
    - More studies are required to ascertain the optimal preparation and injection methods
    - Longer duration required to assess long-term progress
    - Larger sample sizes for more accurate data
    - Greater gender diversity as AGA affects women too
- PRP is a safe alternative to topical minoxidil for the treatment of AGA in adults, but may not be suitable for everyone

References

1. Piraccini BM, Alessandrini A. Androgenetic alopecia. Giornale Italiano di Dermatologia e Venereologia. 2014;149(1):15-24.
2. Androgenetic Alopecia. National Library of Medicine (US). Genetics Home Reference. https://ghr.nlm.nih.gov/condition/androgenetic-alopecia#. Published March 31 2020. Accessed April 5 2020.
3. Treating female pattern hair loss. Harvard Health Publishing. https://www.health.harvard.edu/staying-healthy/treating-female-pattern-hair-loss. Updated November 14 2018. Accessed April 5 2020.
4. Gupta M, Mysore V. Classifications of Patterned Hair Loss: A Review. J Cutan Aesthet Surg. 2016;9(1):3–12. doi:10.4103/0974-2077.178536
5. Birchall, N.M., Sinclair, R. Male pattern hair loss. DermNet NZ website. https://dermnetnz.org/topics/male-pattern-hair-loss/. Updated July 2015. Accessed April 5 2020.
6. Hunt N, McHale S. The psychological impact of alopecia. BMJ. 2005;331(7522):951–953. doi:10.1136/bmj.331.7522.951
7. Androgenetic alopecia. Rare diseases NIH website. https://rarediseases.info.nih.gov/diseases/9269/androgenetic-alopecia. Updated March 1 2020. Accessed April 5 2020.
8. Feinstein, R.P. Androgenetic Alopecia Treatment & Management. Medscape. https://emedicine.medscape.com/article/1070167-treatment. Updated March 5 2020. Accessed April 5 2020.
9. Messenger A, Rundegren J. Minoxidil: mechanisms of action on hair growth. British Journal of Dermatology. 2004;150(2):186-194. doi:10.1111/j.1365-2133.2004.05785.x
10. Stevens J, Khetarpal S. Platelet-rich plasma for androgenetic alopecia: A review of the literature and proposed treatment protocol. Int J Womens Dermatol. 2018;5(1):46–51. Published 2018 Sep 21. doi:10.1016/j.ijwd.2018.08.004