Original Article

Is the Addition of Oral Biotin to PRP More Beneficial for Treating Male Pattern Hair Loss Compared to PRP Alone? A Randomized Control Trial

Hina Khoso[1], Muhammad Fahim[2], Rabeeka Bakhtiar[3]

Abstract

Background: Androgenetic Alopecia (AGA) is a common and progressive condition of patterned hair loss from the scalp and affects both genders with a genetic background. The onset and speed of progression varies among patients. Multiple treatment modalities are in use for the treatment of AA namely minoxidil, finasteride, etc.; however, they are associated with some unacceptable side effects. The efficacy of oral supplements is controversial in AGA. Little data is available on the role of Biotin supplementation in AGA so this trial aimed to fill this research gap.

Objective: To determine the effectiveness of oral Biotin in combination with PRP vs PRP alone in treating Androgenetic Alopecia.

Methods: This is Randomized controlled trial (Trial registration number#TCTR20250506001)**.** One hundred and Eighty patients were enrolled in the study. Group A consisting of 90 patients received four sessions of PRP,1 month apart while Group B was treated with a similar protocol of PRP in combination with oral Biotin 2500mcg once daily for 6 months. Patients were called for monthly follow and final assessments done after 6 months using the Dermatology Quality of Life Index (DLQI) and Digital photography.

Results: The mean age in Groups A and B was 27.74±5.55&29.72±5.40 years respectively. The number of patients was comparable in both groups based on the Norwood Hamilton grading system. The family history was positive in 51.2 % of patients in Group A and 49.5% of patients in Group B. After 6 months of using DLQI and digital photography, compared to baseline, Patients in both groups gained significant hair regrowth but there was no intergroup difference (p value>0.05).

Conclusions: It is concluded that the combination of Biotin supplements with PRP gives no additional benefits in AGA patients.

Keywords: Androgenetic Alopecia, Biotin, PRP.

How to Cite this: Khoso H, Fahim M, Bakhtiar R. Is the Addition of Oral Biotin to PRP More Beneficial for Treating Male Pattern Hair Loss Compared to PRP Alone? A Randomized Control Trial. J Pak Assoc Dermatol. 2025;35(3):199-205.

Received: 16-08-2024 **1st Revision:** 06-05-2025 **2nd Revision:** 02-07-2025 **Accepted:** 09-09-2025

Authors Affiliation:
[1,2]Consultant Dermatologist, Tehsil Headquarters Hospital Takht Bhai Mardan; [3]Dermatology Department, Medical Teaching Institution Hayatabad, Peshawar
Corresponding Author: Dr. Rabeeka Bakhtiar, Dermatology Department, Medical Teaching Institution Hayatabad, Peshawar
Email: drrabeekabakhtiar@gmail.com

Introduction

The AGA is typically characterized by progressive nonscarring loss of hairs from the scalp. It is a common condition involving both men and women with a worldwide prevalence of approximately 50%.[1] The age of onset and speed of progression is variable among patients. Reduced hair density over the vertex follows the recession of frontal hair, which usually starts in the temporal region and is the classic presentation of AGA.[2] A tiny island of hair remains on the frontal scalp while the bald patch grows larger and merges with

the frontal hairline that is retreating. This island of hair then vanishes, leaving the parietal and temporal region covered by a thin strip.[3] Several classification systems are there for both men and women in use but Norwood Hamilton System is more commonly used to grade AGA.[4]

The pathogenesis of AA is complex but involves the interplay between genetic and hormonal factors. 40-50% have got positive family history and that may be associated with early onset and rapid disease progression.[5] Dihydrotestoste-rone (DHT) is a metabolite of testosterone produced by the enzyme 5-alpha-reductase (found in the outer root sheath of hair follicles) and is the main pathogenic factor in AGA acting via Androgen Receptors (AR).[6] The expression of several genes, including those governing the hair development cycle, is altered when AR is activated, which causes the hair follicles to gradually shrink without damaging the stem cells. AA is rare in patients with qualitative or qualitative deficiency of androgens/Testosterone including androgen insensitivity syndrome.[7] Similarly in women, the less severe hair loss may be attributable to reduced expression of 5-alpha-reductase.[8]

A number of approaches to treating AGA have been put forth; ranging from scalp surgery to the use of hair wigs. Of these, only two are FDA approved, Topical Minoxidil and Oral Finasteride. However, due to some unacceptable adverse effects, utilization of other treatment options is needed for most of the patients.[9]

The PRP is a highly concentrated platelet solution consisting of numerous growth factors and has been in use for wound healing, scar treatment, and skin rejuvenation.[10] The two important granules inside platelets are Alpha and Dense granules containing most of the growth factors such as transforming growth factor, insulin-like growth factor-1, fibroblast growth factor basic, platelet-derived growth factor -AB, & -BB, epidermal growth factor, vascular endothelial growth factor, IL-12, etc.[11] These factors increase blood circulation to the Dermal Papilla (DP) and promote cellular differentiation, prolongation of the anagen phase, and prevention of cellular apoptosis thereby, leading to hair regrowth.[12]

Biotin also known as vitamin B7 or vitamin H is a water-soluble vitamin and an essential coenzyme for Numerous carboxylase enzymes involved in the metabolism of amino acids, fatty acids, and glucose 13. Biotin is attached to histones and is involved in transcriptional processes and genome stability. The role of biotin in the synthesis of proteins, particularly keratin, accounts for its significance in the development of healthy nails and hair.[14] Its deficiency may be caused by insufficient dietary intake of biotin, interactions with other drugs, by increased biotin catabolism in smokers and during pregnancy. Cutaneous manifestations of its deficiency include hair loss (alopecia) and periorificial dermatitis; erythematous scaly lesions around the orifices, i.e., eyes, nose, and mouth (similar to that of zinc deficiency) and susceptibility to infections.[15] Biotinidase is an enzyme that recycles biotin and increases its pool for further carboxylation. Its mutations result in neurological, metabolic, ophthalmologic, developmental delay, and cutaneous manifestations similar to acquired biotin deficiency.[16] Biotin may be beneficial for those suffering from pathologic brittle hair syndrome or uncombable hair syndrome.[17] Looking at these observations, the use of Biotin in hair loss conditions including AGA seems logical but very few studies evaluated its role in a randomized manner. This study aimed to fill this research gap.

Methods

It was a randomized controlled study (Regesteration#TCTR20250506001) in which consisting of 180 patients participated. The sample size was calculated using G-Power software keeping a 95% confidence interval and an 80% test power. Upon permission by the hospital's administration, patients were selected using the randomization method of sampling. All patients provided written consent and study protocol, and possible side effects and procedure related complications were explained to them. Ethical review board approval was obtained. PRP was prepared by collecting at least 20ml of fresh venous blood in sodium citrate-containing (PT)bottles under aseptic precaution.

There are many procedures of PRP preparation but in this study protocols of soft spin (2000 revolutions per minute for six minutes) and hard spin (4,000 revolutions per minute for ten minutes) were used. Concentrated plasma was collected and then intradermally injected using 1cc insulin syringes. Group A patients were treated with four sessions of PRP at monthly intervals while group B received the same therapy in combination with Oral Biotin 2500 micrograms per day for 6 months. Efficacy was assessed at baseline and 24 weeks using the Subjective tool Dermatology Quality of Life Index (DLQI) ranging from 0-30 and the Objective tool Digital photography graded as -3=Sever worsening, -2=Moderate worsening, -1=Mild worsening,0=No change,1=Mild improvement,2=Moderate improvement,3=Excellent improvement in hair regrowth. For statistical purposes, only improvement-related categories were taken into consideration. The modified Norwood-Hamilton score and basic demographic information, such as age and disease duration, were collected. The results were finalized after 6 months using the subjective and objective assessment scores, keeping a p-value of <0.05 as significant.

Inclusion Criteria

All male patients with patterned hair loss (Hamilton score II-V), between age 18-50 years, willing to give written consent for the procedure and come for monthly follow-up were included in this study.

Exclusion Criteria

All conditions potentially leading to hail loss such as thyroid abnormalities, anemia, collagen vascular diseases, and malnutrition, etc. History of scalp surgery and the use of drugs such as minoxidil or antiandrogens in the past 6 months as well as patients with major organ failure such as cardiovascular, renal, or hepatic were considered ineligible. Patients with hemodynamic instability (low blood pressure, collapse), thrombocytopenia, HBV/HCV infection, and other disorders that increase the risk of excessive bleeding were also excluded. In addition, patients with local scalp infections and a history of allergy to prior PRP sessions were also not enrolled in the study.

Grading of AGA

Norwood-Hamilton classification system is commonly used for this purpose.[18]

It describes hair loss progression in a series of stages, starting from minimal recession of the frontal hairline (Stage I) to more advanced hair loss involving the frontal, temporal, and vertex (crown) areas. As the stages progress, the hairline recedes further, and the thinning at the crown enlarges until they merge in the most severe cases. This classification helps clinicians assess severity, track progression, and guide treatment decisions for hair restoration.

Data Analysis

The data was entered and analyzed using SPSS Version 24, statistical software for social science. Quantitative variables like Age, disease duration, and age of onset were represented in the form of mean & SD. Qualitative variables liken digital photography and family history were represented by frequency and percentages. Both groups were compared by age, disease duration, the modified Norwood-Hamilton score, and efficacy assessed with the help of DLQI and digital photography. To compare the efficacy in the two groups, a chi-square test was utilized, with a two-sided $P < 0.05$ considered significant. A tables and column charts are s used to summarize the results.

Results

One hundred and eighty study participants included male patients with androgenetic alopecia,90 in each subgroup. (Table 1) displays the fundamental clinical and demographic information for each patient. The mean age and disease duration were 27.74 ± 5.55 & 3.21 ± 1.85 years in Group A and 29.72 ± 5.40 & 3.70 ± 2.37 years in Group B. Based on the Norwood-Hamilton scoring system, II-IV range included the majority of patients in both groups. Most have a positive family history. All patients received 4 sessions of PRP and followed for 6 months. Most patients achieved some degree of improvement in hair growth, slightly more in patients taking oral Biotin, and no worsening in degree of alopecia was seen. Compared to baseline, DLQI decreased on both sides but no

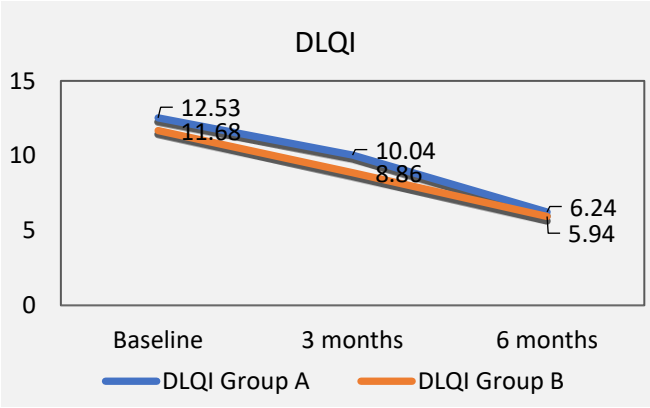

Figure 1: *DLQI changes over time in both groups (P value >0.05, Intergroup).*

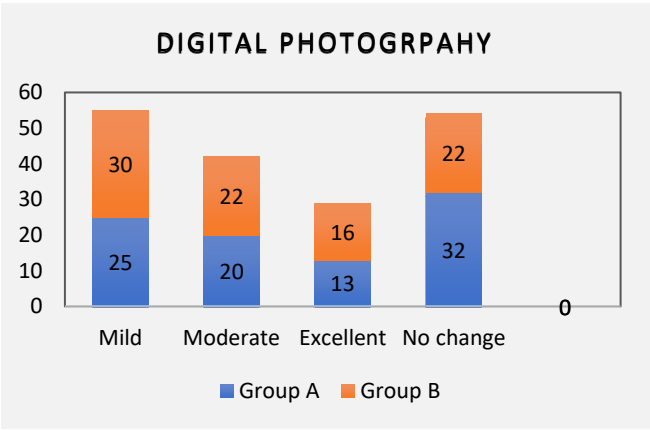

Figure 2: *Digital photography-based assessment of hair regrowth (p value >0.05).*

Table 1: Basic demographic and clinical data.

Parameter	Group A	Group B	P value
Patients in each group	90	90	
Age (years)	27.74±5.55	29.72±5.40	0.015
Disease Duration(years)	3.21±1.85	3.70±2.37	0.136
Family History of AGA	51.2%	47.5%	0.74
Norwood-Hamilton classification			
II	12	11	
III	14	11	
IV	8	10	
V	6	8	
DLQI at Baseline	12.52±4.26	11.68 ±3.23	0.105

(p valve<0.05=significant)

significant intergroup difference was found. (p=0.318), Similarly using digital photography, most patients in Group A and B achieved mild, moderate, or excellent hair regrowth but compared to PRP alone, the addition of Biotin to PRP resulted in no significant hair regrowth (p=0.1031) (Figure 1). Patients with early stages of AGA (II-III) exhibited the largest overall improvement **(**Figure 2).

Discussion

Androgenetic Alopecia is a common condition of non-scarring hair loss affecting both genders often with familial background. The onset is usually after puberty and the speed of progression varies from patient to patient. Multiple treatment options are available, varying in efficacy and adverse effects. Very few studies evaluated the efficacy of oral or topical Biotin for hair loss in a randomized manner. This study aimed to evaluate the efficacy of oral Biotin in male AGA.

In this study, no significant difference was found in terms of hair growth between the groups of patients reviving PRP alone or in combination with oral Biotin 2500 micrograms as assed by DL-QI and Digital Photography b (p value >0.05).

A cross-sectional study conducted by Gupta et al, assessed the quality of life in 200 male AGA patients. All grades of the Hamilton-Norwood classification were included**.** Similar to our study most of the patients were in stage 2&3. The majority of patients (92.5%) sought medical advice for AGA for the first time and did not have any related diseases. More than 45% were in the age range comparable to our study. A positive family history of AGA was noted in about 50% of patients. The mean DLQI was 13.52 ±3.15 and correlated positively with hair-specific Skindex-29 score.[19]

Navakumar Manickam et al, conducted a prospective experiment with 30 patients to assess the effectiveness of PRP in AGA. Comparable to our study were mean age, length of the disease, and number of patients according to the Norwood system. Four sessions of PRP were done three weeks apart. The Evaluator's visual assessment of improvement based on digital photographs and a 7-point patient's perception of improvement were

used for efficacy assessment. Regardless of the affected area, over 60% of patients show mild, moderate, or excellent improvement at the end of the fourth month. In line with our research, people with earlier stages of AGA have better outcomes.[20]

In a randomized controlled trial, the comparative efficacy of PRP in combination with Procapil (Group A) against PRP in combination with a cocktail including Topical Redensyl, Saw Palmetto, and Biotin (Group B) was assessed in an Indian study. Fifty-four male patients with AGA presenting to tertiary care hospital were enrolled in the trial. Patients in both groups were treated with three sessions of PRP three weeks apart. After a 6-week period, Group B showed statistically significant outcomes for the downgrading of AGA according to the Global Photographic Assessment (p value = <0.0001) and Norwood-Hamilton classification (p value=<0.0001).[21]

A systemic review based on 18 case reports was conducted by Deepa_P. Patel et al. All of the patients had some underlying hair or nail abnormalities at presentation. Most have underlying enzyme deficiencies of biotinides or holocarboxylase synthetase. The remaining cases consisted of brittle nail syndrome, quired biotin deficiency secondary to dietary habits or medications, or uncombable hair syndrome. All patients received 2500 µg/ to 20000 µg/ of biotin supplements per day. Interestingly improvement in hair or nails was observed in all cases but time to improvement varied among the patients.[22]

A Samadi, et al, assessed the efficacy of injectable Biotin in diffuse pattern hair loss patients. Two groups of fifty men and women were recruited for the study. One group received 250 mg/2 ml injections of dexpanthenol ampoule and biotin ampoule 5 mg/1 ml, manufactured by two different brands. Six weekly regimes were utilized. On follow up patients in both groups noticed hair regrowth and no difference was found in terms of hair count, global photography score, and trihcoscan assessment (p valve <0.005 in both groups). Similarly, no difference was noted between the two brands of Biotin regarding safety and efficacy.[23]

A prospective trial in Egypt evaluated Biotin deficiency in Telegon Effluvium. The study consisted of 130 cases and 120 healthy controls. Serum Biotin levels were measured in all participants using a commercially available ELIZA kit. The mean serum Biotin levels were found to be significantly lower in cases (p-value <0.001). Based on the hair pull test and dermoscopic examination, improvement was seen in 51.5% of patients and it was inversely correlated with serum Biotin levels (p value <0.001).[24]

Another study conducted in India assessed the role of oral biotin supplementation in AA. Forty healthy male patients with AGA with no associated comorbidities were selected and divided into two groups. The mean age was comparable to our study. The first group consisting of 20 patients received intradermal PRP every fifteen days for 12 weeks along with oral biotin once daily, while patients in the other group used oral biotin only. Three monthly follow-ups were done and final results were calculated after 12 months using a 7-point qualitative scoring system. It was concluded that PRP in combination with oral Biotin results n better hair regrowth compared to Biotin alone (p value < 0.001).[25] The comparatively better results in this study could be explained by the presence of other nutrients/supplements in the formulation (Tablet BTN Ultra, Zydus Liva).

The study's findings are limited in their generalizability because there were only 180 patients, which may limit their representation of the larger community. Secondly, maintenance of hair growth could not be evaluated as no long-term follow-up was carried out. Importantly due to a limited number of randomized trials on the role of oral or topical Biotin in Androgenetic Alopecia, further large-center studies are needed.

Conclusion

Androgenetic Alopecia is a prevalent hair loss condition that has a major negative impact on psychological aspects of life. Previous studies have shown the efficacy of PRP alone or in combination with other medications but in our study, compared to PRP alone, adding oral Biotin to PRP resulted in no additional improvement in hair regrowth. Therefor oral Biotin should not be prescribed

in this condition until and unless its deficiency is documented biochemically.

Ethical Approval: This study was approved by the Post Graduate Medical Institute Peshawar, KPK, Pakistan vide letter No. Ref No. 20166/ PA.Dy.CEO/PGMI.

Conflict of Interest: There was no conflict of interest to be declared by any author.

Funding Source: None.

Author's Contribution

HK: Conception & design, acquisition of data, analysis & interpretation, drafting of article, revising it critically.

MF: Conception & design, acquisition of data, analysis & interpretation, drafting of article, final approval of the version to be published.

RB: Conception & design, drafting of article, analysis & interpretation.

References

1. Liu LP, Wariboko MA, Hu X, Wang ZH, Wu Q, Li YM. Factors associated with early-onset androgenetic alopecia: A scoping review. PLoS One. 2024;19(3):e0299212. Doi: 10.1371/journal.pone.0299212.
2. Martinez-Jacobo L, Villarreal-Villarreal CD, Ortiz-López R, Ocampo-Candiani J, Rojas-Martínez A. Genetic and molecular aspects of androgenetic alopecia. Indian J Dermatol Venereol Leprol. 2018 May-Jun;84(3):263-268. Doi: 10.4103/ijdvl.IJDVL_262_17
3. Xu L, Liu KX, Senna MM. A practical approach to the diagnosis and management of hair loss in children and adolescents. Front Med. 2017;4:112.
4. Bansod S, Sharma A, Mhatre M. Androgenetic alopecia: Clinical features and trichoscopy. *Clin Dermatol Rev*. 2022;6(2):63–8. doi: 10.4103/cdr.cdr_1_22
5. Mu Z, Gao Y, Li K, Liu H, Zhang J. Androgenetic alopecia among hospital staff: a study of prevalence, types and a comparison with general population in a secondary hospital in China. Clin Cosmet Investig Dermatol. 2021:1387-92. Doi: 10.2147/CCID.S333789.
6. Dhurat R, Sharma A, Rudnicka L, Kroumpouzos G, Kassir M, Galadari H, et al. 5-Alpha reductase inhibitors in androgenetic alopecia: Shifting paradigms, current concepts, comparative efficacy, and safety. Dermatol Ther. 2020;33(3):e13379. Doi: 10.1111/dth.13379.
7. Hasan R, Juma H, Eid FA, Al-Aswad HA, Ali WM, Al-Adraj FJ. Effects of hormones and endocrine disorders on hair growth. Cureus. 2022;14(12): e32726. doi:10.7759/cureus.32726.
8. Kruk A, Dorosz A, Skoczeń A, Kulesza M, Wawrzynów W, Jakubowska MM, et al. Adverse effects of finasteride in men treated for benign prostatic hyperplasia and androgenetic alopecia: a literature review. J Educ Health Sport. 2025 ;79:58442.
9. Devjani S, Ezemma O, Kelley KJ, Stratton E, Senna M. Androgenetic Alopecia: Therapy Update. Drugs.2023;83(8):701-715. Doi: 10.1007/s40265-023-01880-x
10. Gentile P, Cole JP, Cole MA, Garcovich S, Bielli A, Scioli MG, et al . Evaluation of not-activated and activated PRP in hair loss treatment: role of growth factor and cytokine concentrations obtained by different collection systems. Int J Mol Sci. 2017; 18(2):408. Doi: 10.3390/ijms18020408.
11. Liu H, Welburn JPI. A circle of life: platelet and megakaryocyte cytoskeleton dynamics in health and disease. Open Biol. 2024;14(6):240041. Doi: 10.1098/rsob.240041.
12. Kourosh AS, Mangual KP, Farah RS, Rao M, Hordinsky MK, Arruda S, et al. Platelet-rich plasma: advances and controversies in hair restoration and skin rejuvenation. Dermatol Surg. 2024;50(5): 446–52. doi: 10.1097/DSS.0000000000004115
13. Soleymani T, Lo Sicco K, Shapiro J. The Infatuation With Biotin Supplementation: Is There Truth Behind Its Rising Popularity? A Comparative Analysis of Clinical Efficacy versus Social Popularity. J Drugs Dermatol. 2017;16(5):496-500.
14. Dedkova LM, Hecht SM. Expanding the scope of protein synthesis using modified ribosomes. J Am Chem Soc. 2019;141(16):6430–47.
15. Saleem F, Soos MP. Biotin deficiency. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing
16. Canda E, Kalkan Uçar S, Çoker M. Biotinidase deficiency: prevalence, impact and management strategies. Pediatric Health Med Ther. 2020;11:127-133. Doi: 10.2147/PHMT.S198656.
17. Bistas KG, Tadi P. Biotin. [Updated 2023 Jul 3]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK554493/.
18. Yengar L, Li J. Male and female pattern hair loss.

Aust Prescr. 2025;48(3):93. DOI: 10.18773/austprescr.2025.020

19. Gupta S, Goyal I, Mahendra A. Quality of life assessment in patients with androgenetic alopecia. Int J Trichology. 2019;11(4):147. Doi: 10.4103/ijt.ijt_6_19.
20. Manickam N, Mathapati P, Somasundaram K, Gopalan K, Ganga Vellaisamy S. Efficacy of Platelet-Rich Plasma in Males With Androgenetic Alopecia. Cureus. 2023;15(3):e36531. Doi: 10.7759/cureus .36531
21. Tr P, Ts R, K SK, Prasanna H. A Comparative Study of Topical Procapil With Platelet-Rich Plasma Therapy Versus Topical Redensyl, Saw Palmetto, and Biotin With Platelet-Rich Plasma Therapy in the Treatment of Androgenetic Alopecia. Cureus. 2023;15(5):e38696. Doi: 10.7759/cureus.38696
22. Patel DP, Swink SM, Castelo-Soccio L. A review of the use of biotin for hair loss. Skin Appendage Disord. 2017;3(3):166-9. Doi: 10.1159/000462981.
23. Samadi A, Ketabi Y, Firooz R, Firooz A. Efficacy of intramuscular injections of biotin and dexpanthenol in the treatment of diffuse hair loss: A randomized, double-blind controlled study comparing two brands. Dermatol Ther 2022;35(9):e15695. Doi: 10.1111/dth.15695.
24. Sabry HH, Abd El Rahman SH, El Awady MA, Noureldine AM, Salama RA. Evaluation of serum level of biotin and effect of biotin replacement therapy in patients with telogen effluvium. Benha J Appl Sci. 2021 ;6(4):113-6.
25. Gupta N. Clinical Evaluation of Intradermal Platelet Rich Plasma Administration along with Oral Biotin Supplement for the Management of Androgenetic Alopecia in Adult Males: A Randomised Clinical Trial. J Clin Diagnostic Res. 2022;16(11).