Impact of Laboratory Work Up and Supplementation on Alopecia Patients: A Single-Center Retrospective Chart Review

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ABSTRACT

Evaluation of alopecia often includes laboratory testing for ferritin, thyroid stimulating hormone, vitamin D, and zinc as previous studies have found associations between non-scarring alopecia and vitamin deficiencies. These studies are limited by small sample sizes, and subsequent analyses showed conflicting results. This study aims to explore laboratory abnormalities in non-scarring alopecia and examine whether supplementation is associated with increased hair growth. A total of 131 patients completed at least two visits by a hair specialist at NYU's Faculty Group Practice. They had quantitative hair measurements taken at each visit and laboratory tests performed at the first visit. There were 20 (15.3%) patients with abnormal lab results. The most common vitamin deficiency was ferritin (6.5%). Forty-two (32%) patients received supplementations that specifically addressed their vitamin or hormone deficiency. Multivariate regression analysis showed that supplementation did not significantly impact hair density or diameter (P=0.73; P=0.96, respectively). Baseline hair density and diameter were positively associated with change in hair density and diameter, respectively (standardized coefficient [β] 0.57, P<0.01; β 0.61, P<0.01). The number of prescribed oral medications was negatively associated with change in hair diameter (β -6.60, P=0.04). Limitations of this study include the single-center, retrospective design and the short follow-up interval. However, our findings suggest that vitamin supplementation may not lead to improved outcomes in non-scarring alopecia, thus limiting the utility of laboratory testing. Additional large-scale prospective studies are needed to improve our management of alopecia.

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INTRODUCTION

Non-scarring alopecia is the most common presentation regarding hair loss. Evaluation of alopecia often includes laboratory testing for ferritin, thyroid stimulating hormone (TSH), vitamin D, and zinc, as previous studies found associations between non-scarring alopecia and vitamin deficiencies.[1,2] However, many of these studies included small sample sizes, and subsequent analyses have shown conflicting results.[2] To our knowledge, no large-scale study has evaluated whether vitamin or mineral supplementation leads to improved hair outcomes. This study aims to explore laboratory abnormalities in non-scarring alopecia and examine whether supplementation is associated with increased hair growth.

We performed a retrospective analysis of patients with non-scarring alopecia diagnoses seen at NYU Faculty Group Practice (FGP) by an alopecia specialist between January 1, 2008 – September 1, 2018. Patients completed at least two visits, had quantitative hair measurements (density in hairs/cm^2 and diameter in microns) at each visit, and laboratory tests at the first visit. All quantitative hair measurements were performed by the same alopecia specialist. Each measurement was taken 12cm from the glabella. Abnormal results were defined as lab values below NYU's outpatient laboratory normal reference range. We performed a multivariate linear regression to evaluate the effects of various factors on hair growth. Statistical analysis was performed using R.

A total of 131 patients met the inclusion criteria (Table 1). Most participants were female (91.6%) and the mean age was 47.4 years. The most common diagnosis was androgenetic alopecia (43.5%), followed by androgenetic alopecia with telogen effluvium (37.4%), and telogen effluvium (14.5%). Most patients (85.1%) used topical minoxidil as treatment for their alopecia. The median number of oral medications prescribed at the first

TABLE 1.

Participant Characteristics and Outcomes	
Characteristic	**Population (N=131)**
Female sex, n. (%)	120 (91.6)
Age, y	
Mean ± SD	47.5 ± 17.3
Median (range)	49 (18 – 76)
Length of follow-up in days, mean ± SD	131.6 ± 32.3
Diagnosis at initial visit, n. (%)	
Androgenetic alopecia	57 (43.5)
Androgenetic alopecia + telogen effluvium	49 (37.4)
Telogen effluvium	19 (14.5)
Androgenetic alopecia + lichen planopilaris	3 (2.3)
Androgenetic alopecia + frontal fibrosing alopecia	1 (0.8)
Alopecia areata	1 (0.8)
Alopecia areata + androgenetic alopecia + telogen effluvium	1 (0.8)
Participants with abnormal lab results, n. (%)[a]	20 (15.3)
TSH	3/97 (3.1)
Vitamin D	7/103 (6.8)
Zinc	4/106 (3.8)
Ferritin	8/124 (6.5)
Participants who received supplements, n (%).[b]	42 (32.1)
Levothyroxine	2
Vitamin D	25
Zinc	6
Iron	25
Number of oral medications prescribed at first visit, median (range)	1 (0–3)
Participants who received topical minoxidil	114/131
Participants who received oral finasteride	63/131
Participants who received oral spironolactone	17/131

[a]Cut offs for each laboratory test were as followed: TSH <0.450 mU/L, Vitamin D <19.9 ng/mL, Zinc <56 ng/mL, and Ferritin <15 ng/mL. [b]NYU laboratory guidelines were used to define patients with low ferritin and vitamin D, however patients were supplemented at <40 ng/mL and <30 ng/mL, respectively.

visit was one, with finasteride (48.1%) being most common. There were 20 (15.3%) patients with abnormal lab results: three (3.1%) with abnormal TSH, seven (6.8%) with abnormal vitamin D, four (3.8%) with abnormal zinc, and eight (6.5%) with abnormal ferritin. Two patients had more than one abnormal result.

Forty-two (32%) patients received supplementation. While NYU laboratory guidelines were used to define patients with low ferritin and vitamin D, patients were supplemented at <40 ng/mL and <30 ng/mL, respectively. Patients were started on supplements immediately after finding abnormal lab results and received supplements that specifically addressed their vitamin or hormone deficiency. Our results showed no statistically significant difference in hair measurements at baseline or follow-up between supplemented and non-supplemented patients (Table 2). There was no significant difference in the change in hair density and diameter between groups. Multivariate regression analysis confirmed that supplementation did not significantly impact hair density or diameter (P=0.73; P=0.96, respectively). Baseline hair density and diameter were positively associated with change in hair density and diameter, respectively (standardized coefficient [β] 0.57, P<0.01; β 0.61, P<0.01). The number of prescribed oral medications was negatively associated with change in hair diameter (β -6.60; P=0.04). It is likely that patients on a higher number of oral medications had more severe non scarring alopecia and thus were more likely to have poorer response compared to those with milder hair loss at initial presentation.

Our findings suggest that laboratory testing may not be useful for the management and treatment of non-scarring alopecia. The prevalence of abnormal TSH, vitamin D, and zinc levels in our cohort was lower than the prevalence amongst the general adult population.[3-5] Supplementation was also not associated with increased hair density or diameter, therefore supplements – although important for optimal nutrition – may not lead to improved outcomes in androgenetic alopecia or telogen effluvium. Finally, we found that factors beyond supplementation, such as baseline hair parameters and the number of prescribed oral medications, may serve as better predictors of hair growth.

TABLE 2.

Growth Quantification Assessed by Folliscope Analysis for Treatment at Baseline and at Follow-up						
	Hair Density (hairs/cm^2)			Hair Diameter (microns)		
	Supplemented Patients	Not Supplemented Patients	*P* value	Supplemented Patients	Not Supplemented Patients	*P* value
Baseline (mean +/- SD)	141.6 +/- 33.3	141.4 +/32.8	0.974	51.2 +/- 10.6	49.8 +/- 10.8	0.492
Follow-up (mean +/- SD)	152.0 +/- 28.7	155.9 +/32.1	0.510	57.6 +/- 12.6	56.7 +/- 12.6	0.711
Change (mean +/- SD)	10.5 +/- 28.6	14.5 +/26.8	0.432	6.4 +/- 10.9	6.9 +/- 11.2t	0.807

Limitations of this study include the single-center, retrospective design and the short follow-up interval. Furthermore, information regarding skin type, curl pattern, and other demographics were not obtained in our cohort and could not be evaluated. Large-scale prospective studies are needed to improve our understanding and approach to alopecia treatment.

DISCLOSURES

Dr. Shapiro is a consultant for Aclaris Therapeutics, Incyte, and Replicel Life Sciences. Drs. Shapiro and Lo Sicco have been investigators for Regen Lab and are investigators for Pfizer. Dr. Lo Sicco is a consultant for Pfizer. The other authors have no relevant conflicts.

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