

Dermoscopic evaluation of efficacy of 308 nm Excimer Laser in treatment of alopecia areata: A prospective study

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Abstract

Objective To evaluate the therapeutic response of Excimer Laser in treatment of alopecia areata by dermoscopy.

Methods A total 34 patches in 24 patients were administered with 308nm excimer laser twice a week for 12 weeks and followed up after 3 months of last sitting. Treatment response was evaluated using regrowth scale (RGS) and dermoscope was used to assess disease activity, response to treatment and side effects.

Results Among 34 patches, 4 patches (13%) showed excellent response, 16 patches (47%) showed good response, 7 patches (20%) showed moderate response and 7 patches (20%) showed poor response. Dermoscopically, 27 patches (responders) showed reduction in black dots, yellow dots, broken hairs, tapering hairs and appearance of short vellus hairs which are signs of remitting disease, compared to 7 patches (nonresponders), who showed no change. Yellow dot was the most common dermoscopic finding seen among 85.3% at baseline.

Conclusion The excimer laser is one among the efficacious treatment for Alopecia areata. Dermoscopy is useful to assess the response to treatment and side effects.

Key words

Alopecia areata; Excimer laser; Dermoscopy; Yellow dots; Short vellus hairs.

Introduction

An autoimmune condition called alopecia areata (AA) results in non-scarring hair loss.¹ Autoimmune, genetic, and environmental variables have all been linked to the disease's development.² Both males and females are impacted in the same way.³ AA is treated by

targeting the autoimmune reaction; however, past therapy techniques have limitations and consequences, necessitating the development of a novel treatment modality. As a result, excimer laser therapy, which causes T cells apoptosis, has been considered.⁴

Common dermoscopy findings of AA include black dots (BD), yellow dots (YD), short vellus hair (SVH), exclamation mark hair, broken hair (BH) and tapering hair (TH). Following treatment, the frequency of these distinctive findings decreases while the number of unpigmented vellus hair increases.² So we are using dermoscope as therapeutic tool in evaluating the response.

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Methods

Following institutional ethics committee approval (No. MIMS/IEC/524 dated October 22, 2021), this six-month study involved 24 patients with Alopecia areata, totalling 34 patches, regardless of age or gender. The study took place from June 2021 to November 2021. Patients with AA visiting the outpatient department, fulfilling the inclusion criteria of having AA irrespective of their age and sex, who give informed consent to participate in the study, with 1-3 patches of AA, who haven't taken treatment for the same in last 4-6 weeks were included.

Patient with history of medical and or surgical treatment or hair growth products taken for AA in last 4-6 weeks, with endocrine/immunological diseases causing hair loss, pregnant and lactating women, severe seborrheic dermatitis, reasons other than AA for hair loss, scalp psoriasis, unstable coexisting medical conditions, scalp infections, history of photosensitivity and keloid tendency, clinical types of AA other than patchy type, with more than 3 patches were excluded.

Prior to their enrollment in the study, patients provided written informed consent. A pre-made proforma will be used to collect and record the patient's demographic information as well as related medical history, including origin, age of onset, progression, clinical type, personal history, and family history. The minimal erythema dose was established on the patient's back prior to the initiation of treatment. For a maximum of 24 sessions (in the course of three months), each AA patch was treated with a 308 nm excimer laser (Excimal Elite) twice a week.

Fluence at first was 50 mJ/cm² lower than the minimal dose of erythema. At every two sessions after that, fluences were raised by 50 mJ/cm². Digital photos were taken before

treatment as well as at 4 weeks, 8 weeks, 12 weeks, and 3 months after treatment cessation. Dermoscopic pictures (taken with a Dermlite DL3N dermoscope) were taken at the center and 3 o'clock position of the patch.

Remitting disease is indicated by the growth of short vellus hairs and thus an indicator of a response to treatment. Alopecia areata's disease activity signs include tapering hairs, black dots, damaged hairs, and yellow dots, which are the first to respond to treatment.² The clinical improvement was rated as excellent, good, moderate, poor or absent response by using four point scale as follows:⁵

Grade 1= 0-25% Poor response

Grade 2= 26-50% Moderate response

Grade 3= 51-75% Good response

Grade 4= 76-100% Excellent response

A scale of 0 representing not satisfied, 1 representing satisfied, and 2 representing extremely satisfied was used to assess patient satisfaction. Patients were watched for laser side effects such as scaling, erythema, and itching. After completion of treatment period, patients were followed up after 3 months.

IBM Corporation, Chicago's SPSS software, version 20, was used to analyze the data. Simple statistical tests like mean, median, and standard deviation and also descriptive and analytical statistical tests were performed. The efficacy of treatment modality was compared using the Friedman and Chi-square tests and P values below 0.05 were regarded as statistically significant.

Results

This study included 24 patients with 34 patches in total. The study population consisted of 42% females and 58% males, with a male to female

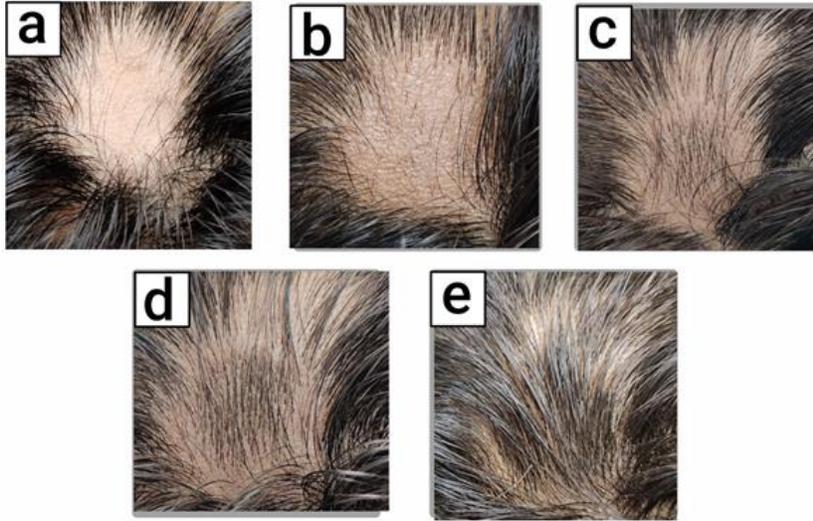


Figure 1 Clinical photographs of patchy alopecia a) at baseline, b) at 4 weeks, c) at 8 weeks, d) at 12 weeks, e) 3 months after last sitting with nearly complete hair regrowth of patient 1.

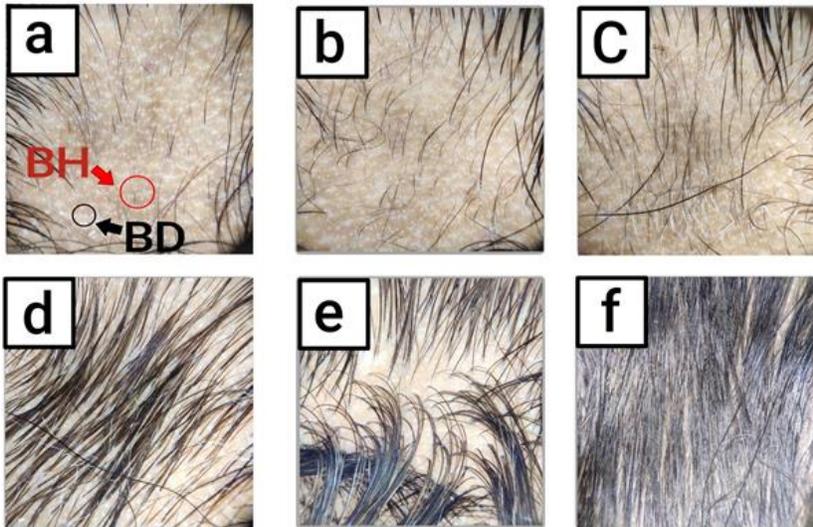


Figure 2 Dermoscopic pictures of patchy alopecia a) at baseline with BH and BD, b) at 4 weeks, c) at 8 weeks, d) at 12 weeks, e) 3 months after last sitting with disappearance of BH, BD with hair regrowth of patient 1.

ratio of 1.4:1 and a median age of 28 years (with a range of 20-45 years). A family history and a history of similar issues in past were observed in 16.6% and 29% of cases, respectively. A total of 12.5% of patients had associated comorbidities. Nail abnormalities were seen in 16.6%, where nail pitting was most common.

Among 24 patients with total of 34 patches, 18 patients had one patch each, 2 patients had 2 patches each and 4 patients had 3 patches each. Out of 34 patches, 23 patches were on scalp, 2 patches on eyebrows, 2 patches on moustache, 7 patches were on beard area. Four patches were present since <3 months and 17 patches were present since >6 months with mean duration of

2.38 ±0.69 months (mean±SD).

YD were the predominant dermoscopic finding seen in 85.3% of patches at baseline followed by SVH seen in 79.4%, BD and BH in 61.76% each, TH in 35.29%, pigtail hair in 8.8%, coudability hair in 5.8%.

Among 34 patches, 27 patches showed decrease in dermoscopic features and appearance of short vellus hairs with the treatment were considered as responders (**Figures 1-4**) and 7 patches showed no changes in the dermoscopic features of disease activity and appearance of short vellus hairs were considered as nonresponders.



Figure 3 Clinical photographs of patchy alopecia a) at baseline, b) at 4 weeks, c) at 8 weeks, d) at 12 weeks, e) 3 months after last sitting with nearly complete hair regrowth of patient 2.

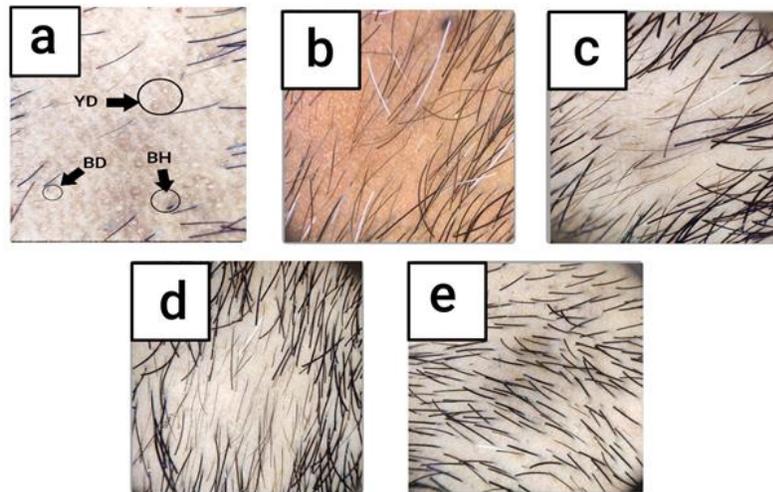


Figure 4 Dermoscopic pictures of patchy alopecia a) at baseline with BH and BD, b) at 4 weeks, c) at 8 weeks, d) at 12 weeks, e) 3 months after last sitting with disappearance of BH, BD with hair regrowth of patient 2.

Table 1 shows the significant changes in the dermoscopic features and appearance of short vellus hairs with baseline, fourth weeks, eight weeks, twelfth weeks, and three months after last sitting. Statistical analysis of results were noted in **Table 2**.

Among 34 patches, 7 patches showed poor response, 7 patches showed moderate response, 16 patches showed good response and 4 patches showed excellent response. Patient's satisfaction was measured using 3 point scale where, twelve (50%) patients were extremely Satisfied, given a score of 2, five patients (20.8%) expressed satisfaction with score 1, while seven patients (29.2%) expressed dissatisfaction with score 0. Erythema, itching, and scaling were the side effects noted in few patients.

Discussion

AA is a recurrent autoimmune inflammatory hair loss that affects the body and/or scalp and is not scarring. Pelade or Area Celsi are other names for it.⁶

It usually shows up as an abrupt loss of hair in localized areas. Typically, the lesion is a single circular or oval patch.⁷ At some point in their lives, 1.7% of people will experience an AA episode. Both sexes are affected equally, and the majority of new cases are reported in people under the age of 30. Infection, narcotics, trauma, and stress have all been suggested as possible triggers for AA. Atopy, thyroid autoimmune illness, and vitiligo are all frequently linked. AA episodes can be triggered by a variety of

Table 1 Significant changes in dermoscopic features in responders (n=27) with treatment.

Dermoscopic findings	Number of patches (%)				
	Baseline	4 th week	8 th week	12 th week	3 months after last sitting
Reduction in BD	14	4 (28.6%)	9 (64.3%)	10 (71.4%)	12 (85.7%)
Reduction in YD	22	8 (36.4%)	13 (59.1%)	18 (81.8%)	22 (100%)
Reduction in BH	14	5 (35.7%)	6 (42.9%)	8 (57.1%)	10 (71.4%)
Reduction in TH	5	1 (20%)	2 (40%)	3 (60%)	3 (60%)
Apperance of SVH	0	4 (14.8%)	15 (55.6%)	22 (81.5%)	27 (100%)

BD= Black Dot, YD= Yellow Dot, BH= Broken Hair, TH= Tapering Hair, SVH= Short Vellus hair.

Table 2 Statistical evaluation of dermoscopic features following treatment.

Dermoscopic Features	Mean ± Standard deviation (Baseline)	Mean rank (Friedman test) (Baseline)	Mean ± Standard deviation (3 months after last sitting)	Mean rank (Friedman test) (3 months after last sitting)	Chi square/ D.F/ P value
BD	5.26±4.371	3.51	2.79±3.365	2.29	43.583/ 4/ .0001
YD	9.38±4.328	3.90	3.68±3.796	1.71	78.453/ 4/ .0001
BH	5.26±4.365	3.43	3.12±3.444	2.41	35.485/ 4/ .0001
TH	1.74±2.756	3.13	1.18±1.992	2.82	11.418/ 4/ .022
SVH	.00±.000	2.00	6.15±3.807	4.59	96.541/ 4/ .0001

BD= Black Dot, YD= Yellow Dot, BH= Broken Hair, TH= Tapering Hair, SVH= Short Vellus hair

physical or psychological traumas.⁸

Clinical signs of AA include smooth, circumscribed patches of hair loss on the torso, beard, and head. Alopecia totalis, which is complete hair loss on the scalp and alopecia universalis, which is complete hair loss on the body are the two possible outcomes.⁹ It is possible to confuse androgenic alopecia with alopecia sisaipho, or hair loss in the frontal, temporal, and parietal regions. Alopecia ophiasis, or hair loss in the parietal and occipital regions, is a condition with a dismal prognosis.¹⁰

The peribulbar region exhibits CD8+ and CD4+ T lymphocyte infiltration, which histologically characterizes the early stage of AA.^{11,12} A large number of small hair follicles signify the advanced stage. This pathogenesis is caused by Janus kinase/ signal transducer and activator of transcription-dependent cytokines, including interleukin (IL) 15 and interferon gamma.¹³

Risk factors associated with a poor prognosis in AA include episode duration longer than a year, childhood disease onset, association with

autoimmune diseases primarily endocrine, with atopy, genetic diseases

Dermoscopy has shown to be an invaluable technique in the diagnosis and treatment of hair diseases. BD, TH, and BH are all specific to AA and signal high disease activity. The severity of AA was positively linked with BD and YD. SVH were found to be negatively linked with both disease activity and AA severity.¹⁵

Topical, intralesional, and/or systemic immunosuppressive medications such as corticosteroids, as well as topical irritants such as anthralin, sensitising compounds such as diphenycprone and psoralen, and ultraviolet light A irradiation are commonly used to treat alopecia areata.⁵ The excimer laser's high dose of monochromatic UV radiation at 308 nm affects both T cells apoptosis and the release of cytokines, including IL-4, prostaglandin E2, IL-10, cis-urrocanic acid, platelet activating factor. Hair regrowth was induced in patchy AA.¹⁰

Al Hamzawi NK conducted a study using

excimer laser 308 nm in which 18 patients were enrolled and 64 patches were studied. Approximately 33.33% of patients had an excellent response (75–99%) and 27.77% of patients showed good response (50-74%), in contrast to 11.80% of patches showed excellent response and 47% of patches showed good response.⁸

In a research conducted by Ohtsuki *et al*; 57 percent of patients showed regrowth of >50 percent of the lesional region, while 47 percent of patches showed satisfactory response.⁷

Small sample size and brief follow-up period were the study's drawbacks, which meant that further investigation was required to validate our results.

Conclusion

Nonscarring hair loss is characteristics of autoimmune diseases like AA. Our research revealed that one of the most successful, safest, and most tolerable treatments for AA was the 308 nm excimer laser. To develop a therapeutic protocol for this option to manage AA, more researches are required.

Declaration of patient consent The authors certify that they have obtained all appropriate patient consent.

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Conflict of interest Authors declared no conflict of interest.

Author's contribution

DK, MPR: Substantial contributions to study design, acquisition of data, manuscript writing, has given final approval of the version to be published.

SBM: Substantial contributions to concept, study design, critical review, has given final approval of the version to be published.

HMR: Substantial contributions to analysis and interpretation of data, critical review, has given final approval of the version to be published.

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