



The Efficacy of Excimer Laser in the Treatment of Alopecia Areata Ahmed M. M.

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Submit Date 21-06-2024

Revise Date 27-06-2024

Accept Date 01-07-2024



ABSTRACT:

Background: Alopecia areata is a widespread, non-scarring, autoimmune T cell-mediated condition that causes patchy hair loss on the scalp and other regions of the body. This study aimed to the efficacy of excimer laser in the treatment of alopecia areata. **Methods:** An interventional clinical study was conducted among 15 patients diagnosed with scalp alopecia areata, who received their treatment only as one session of excimer laser per week for 3 months. Treatment of alopecia areata was done according to the study protocol and the follow-up was made by taking photographs every two sessions for evaluation of the percentage of hair regrowth and calculation of SALT II score difference before and after treatment. **Results:** the duration of treatment required for achieving the treatment in the studied group excimer alone up to 12 weeks. In the complete response to treatment of complete responder (SALT II= 0 after treatment), we recorded 26.7% of the studied group are complete responders (100% hair regrowth) while the non-responders (SALT II before =SALT II after) the studied group recorded a percentage of non-responders (46.7%) hair regrowth =0. **Conclusions:** Excimer laser is an effective tool in the treatment of patchy alopecia areata of mild to moderate degree.

Keywords: Alopecia areata; SALT; Excimer Laser.

INTRODUCTION

An extremely common form of inflammatory, nonscarring hair loss is alopecia areata (AA). The clinical manifestation of AA has been shown to differ significantly, ranging from localized, well-defined hair loss to complete loss of scalp and body hair. Hair is lost along with the hair follicles loss results from the immunologically mediated illness alopecia

areata. The exact cause of Alopecia areata is unknown [1].

Treatments for AA include included systemic steroids, contact immunotherapy, intralesional corticosteroid injections, topical corticosteroids, and immunosuppressants. Nevertheless, there are few therapy alternatives available for refractory AA that do not respond to these traditional therapies [2].

One of the novel methods for treating AA is the excimer laser. Excimer lasers are thought to cause pathogenic T cells to undergo apoptosis, however, the precise process is unknown. This could result in therapeutic effects for inflammatory illnesses like psoriasis. Since AA was discovered to be an autoimmune illness marked because T cell activation causes inflammation within the hair follicle, excimer laser application has been proposed [3]. This study set out to investigate the efficacy of excimer laser treatment for alopecia areata.

METHODS

This study, Interventional clinical was conducted at Dermatology, Venereology and Andrology Department Faculty of Medicine, Zagazig University during the period of from February 2022 to October 2022. The study included 15 patients who received excimer laser treatment only once a week for 3 months. An informed written consent was signed by all participants and the study design was approved by the ethical committee, Faculty of Medicine, Zagazig University (IRB#9276/23-1-2022). The work was completed in accordance with the Declaration of Helsinki, the World Medical Association's code of ethics for studies involving human subjects. The inclusion criteria include patients diagnosed with any type of alopecia areata who were between the ages of 6 and 60 years of both sexes. While, the exclusion criteria include patients with a history of systemic treatment or phototherapy, 6 weeks before the study. Patients having other types of skin diseases such as atopic dermatitis, vitiligo, and psoriasis. Pregnant or lactating female. Patients with other chronic diseases, cancer, or on immunosuppressive therapy.

All patients were prior to the first session, all patients were counseled about the potential side effects and advantages of the treatment

before providing their medical consent. A correct history was recorded. Past medical history included instances of autoimmune illnesses, fever, stress, illness, anemia, and surgery. Drug use, radiation, chemotherapy, prior treatment history (e.g., minoxidil), and allergy to prior treatments are all covered. dermatological assessment of the hair loss lesion(s), whether one or more. Severity of Alopecia Tool score (SALT score) is used to assess severity.

According to "Severity of Alopecia Tool score" the scalp is separated into 4 sections (SALT score): Vertex: 40% (0.4) of the scalp's surface area; the scalp's right profile; of the scalp's surface area, 18% (0.18) is found in the left profile, and 24% (0.24) is found in the posterior aspect. The proportion of hair loss in each of these regions is calculated by multiplying the percentage of the scalp's surface area by the percentage of hair loss. The total percentage of hair loss in each of the aforementioned regions is the SALT score (Figure 1) [4].

SALT subclasses; S0 = no hair loss, S1 = hair loss <25% of scalp, S2 = hair loss 25% - 49% of scalp, S3 = hair loss 50 - 74% of scalp, S4 = hair loss 75 - 99% of scalp, S5 = 100% hair loss [4].

SALT II: A revised method for calculating the percentage of scalp hair loss using the Severity of Alopecia Tool (SALT) based on the area measured [5].

A number of factors make the proportion of scalp surface area (SSA) linked to various hair loss diseases is intriguing, as are the stages of a specific ailment, the implications of the prognosis for hair regeneration, the amount of medicine needed for treatment, and assessments of its efficacy [5].

The previously published Severity of Alopecia Tool (SALT) score is used to determine the severity of hair loss in alopecia

areata (AA) based on the percentage of SSA impacted on the top, back, and both sides of the scalp it was modified to incorporate smaller steps of scalp covering in this figure (SALT II) to aid in the evaluation of hair loss: Male pattern hair loss (MPHL) and frontal fibrosing alopecia (FFA) are two instances of disorders that only cause localized scalp damage. The majority of hair loss occurs in small patches, as in cicatricial alopecia, or AA [5].

26 female head circumferences [53–58 cm (mean 56 cm)] and 26 men [mean 58 cm, range 54.5–62 cm] respondents were measured in order to calculate the total and 1% SSA. The total SSA of two male participants from each category was then measured after the head circumferences were divided into small, medium, and big categories. These six male patients provided a conversion factor that was used to interpolate the SSA for the remaining subjects. The average SSA result for all 52 individuals was 705 cm², with the smallest head being 607 cm² and the largest head measuring 842 cm². The SALT II graphic's components display percentages of the total SSA, rounded to the closest whole number. One percent of the SSA was approximately 7 cm²[5].

These tools are similar to the five fingers plus palm approach and the "rule of nines" that are used to determine the percentage of body surface area in various cutaneous lymphoma locales. With the new figure of the scalp, it is possible to successfully quantify both total scalp hair loss and hair loss on a specific area of the scalp, like the central aspect of the scalp, in order to assess the involvement of MPHL, female pattern hair loss (FPHL), central centrifugal cicatricial alopecia (CCCA), or the frontal and temporal hair loss in FFA. This figure can also be used to

characterize hair loss patterns for AA, MPHL, FPHL, CCCA, and FFA [5].

Rule of thumb: A simple tool to estimate 1% scalp surface area[6].

The definition of the scalp surface area (SSA) in 1% steps was recently added to the SALT. With such fine precision, it is possible to analyze small patches of hair loss precisely and accurately, which is clearly valuable in interventional trials. The inability to visually estimate 1% SSA involvement is a hurdle when utilizing the upgraded SALT. We explain how to measure this metric.

1% of the adult SSA is 5.2-7.1 cm², as the adult SSA is 520-705 cm². The thumbprint measures 5.5 cm²+1.3 cm² on average. Therefore, we postulated that 1% SSA could be accurately measured using the thumb, and more specifically, the thumb projection. Given that thumbprints were compared on a model of an adult male cranium; the thumbprint is smaller than the thumb projection [6].

Thumb projections were arranged in juxtaposition, but there is a gap between the prints since the thumb projection is larger than the contact surface, or thumbprint. The scalp is divided into four quadrants by the Severity of Alopecia Tool. Given the quadrant's known 24% SSA, the back quadrant (A) fits 24 thumbprints or 24 thumb projections. Similarly, the upper quadrant (D) fit 40 thumbprints, while the left and right quadrants (B, C, and D) each fit 18 thumbprints, by the known SSA values of these quadrants, which are 18%, 18%, and 40%, respectively. Scalp surface area, or SSA [6].

In our investigation, we measured the area of the scalp involved as AA before and after the treatment term and calculated the difference between using the SALT II figure and thumbprint.

SALT II before = SALT II after considered non-responders

SALT II = 0 after treatment considered full response

The value of difference between before and after treatment SALT II is then compared in the study.

The higher value of difference indicates the better response and vice versa.

Excimer laser therapy

For three months, the treated patches were subjected to weekly radiation exposure at regular intervals (12 sessions).

Depending on the kind of skin, the first radiation exposure was typically between 100 and 200 ml. If there was no negative reaction from the previous session, the radiation dose was increased by 100 ml each time. The dosage is continued if erythema lasts for twenty-four to forty-eight hours. If the itching is present or the erythema persists for more than 48 hours, the dosage is lowered by 100 ml in the subsequent session. Additionally, if the erythema becomes painful or is accompanied by vesicles or bullae, the next session of treatment will be postponed [7].

Digital photography of the lesions of hair loss:

Using a digital camera, the lesions were captured on camera for the purpose of evaluating the outcomes. The images were captured at week zero (at the beginning of treatment), 2, 4, 6, 8, 10, at two-week intervals, and again after 12 weeks.

Statistical analysis:

Data were analyzed using IBM SPSS 23.0 for Windows (SPSS Inc., Chicago, IL, USA) and NCSS 11 for Windows (NCSS LCC., Kaysville, UT, USA). Quantitative data were expressed as mean \pm standard deviation (SD).

RESULTS:

Table 1; showed that the general

characteristics of the cases included in this study the mean age were 11 years, about 66% of the studied cases were males and about 33% were females (male predominance). Table 1; shows that clinical data of studied alopecia areata lesions, most of the cases 93.3%, in the studied group had mild degree lesions **S1**, while several lesions ranged from 1-13 areas of alopecia areata, most of the cases had less than 5 areas of alopecia 80%. That treatment duration ranged from almost 4 weeks up to 12 weeks, and the mean duration was 10.9 weeks

Table 2; shows that the SALT II score was statistically significant among the studied group before and after treatment which indicates the effectiveness of the therapy used in these cases

Table 3; shows that complete response to treatment was found among 26.7% of the group (hair regrowth 100% A5) while only 4(26.7%) patients showed partial response (A2,A3,A4) and 7 patients (46.7%) showed no hair regrowth(A0).

Table 4; shows the relapse of the studied cases with complete response after treatment in 25% of the studied cases. Duration to relapse occurrence was less than 6 months among studied cases of group.

Case Presentation:

Case 1: Male (6 years old) with a single patch of Alopecia Areata over the back of the scalp. (A) First visit patch of alopecia areata clinical view. B) After the treatment (the same patch after 6 sessions of excimer alone with significant hair regrowth).

Case 2: A male patient 44 years old presented with multiple patches of Alopecia Areata received 12 sessions over 12 weeks there was just a partial response. (A) First visit patch of alopecia areata clinical view. B) After the treatment (the same patch after 12 sessions of

excimer alone with partial hair regrowth).

Table(1):General characteristics of studied group

	Treated group
Age	18.7 ± 14.8
Median	11
Range	6-44
	N (%)
Sex	
Male	10 (66.7%)
Female	5 (33.3%)
Comorbidities	0 (0.0%)
Characteristics of the lesion among studied groups	Studied groups Mean ± SD
Disease onset/months	8.93 ± 9.86
Median	6
Range	1-36
	N (%)
Degree of severity	
Mild S1	14 (93.3%)
Moderate S2	1 (6.7%)
Severe S3-S4-S5	0 (0.0%)
Number of lesions	
<5	12 (80.0%)
≥5	3 (20.0%)
Treatment characteristics	Studied groups Mean ± SD
Duration/ weeks	10.9 ± 1.69
	8-12
Number of sessions	10.9 ± 1.61
	8-12

Table (2):SALT II before and after treatment among studied group

	Studied groups Mean ± SD
	The treated group
Before	6.9 ± 10.2
Median	3
Range	2-42
After	5.53 ± 9.41
Median	2
Range	0-37
P value for change within the same group	0.049 S

Table (3):The clinical Response to treatments among studied group

	Studied group
Complete	4 (26.7%)
Partial	4 (26.7%)
No response	7 (46.7%)

A0= no hair regrowth or further loss
 A1=1-24% hair regrowth
 A2=25-49 %hair regrowth
 A3=50-74 %hair regrowth
 A4= 75 -99% hair regrowth
 A5=100% full hair regrowth

Table (4): Relapse after complete response to treatments among studied groups.

	The treated group N=4
Relapse	1 (25%)
Duration to relapse	1 (25%)
< 6months	0
>2 up to 12 months	

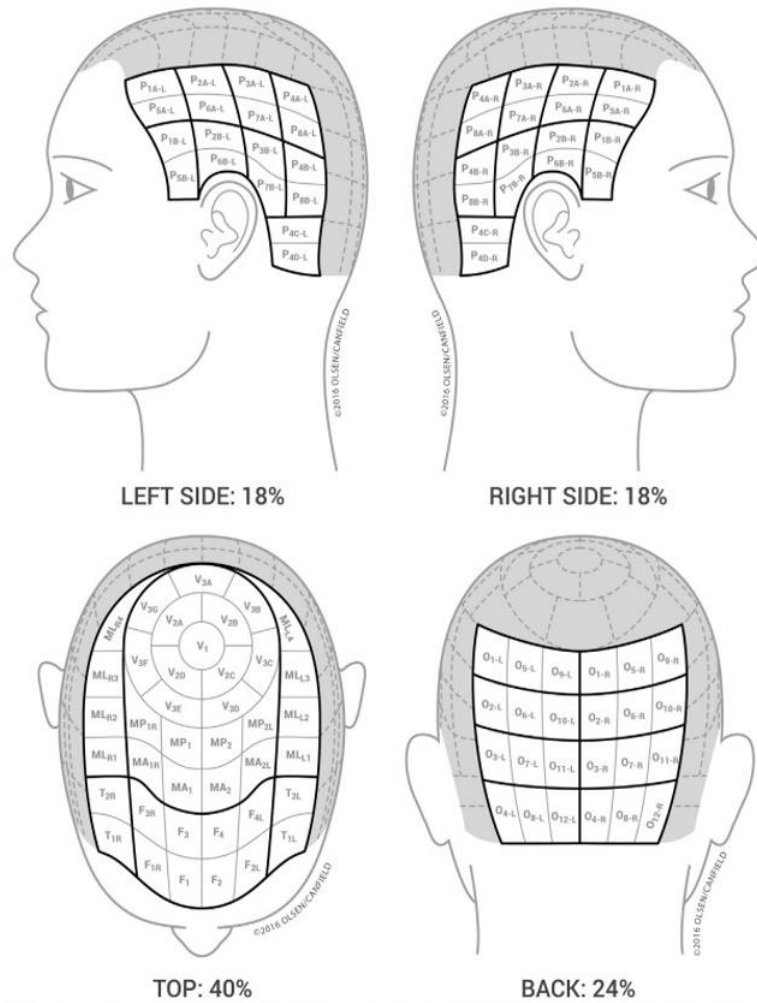


Fig. 1: SALT II aid for determining scalp surface area more precisely than SALT score[5].

Case 1: Male (6 years old) with single patch of Alopecia Areata over the back the scalp.



A)before treatment



B)After the treatment (the same patch after 6 sessions of excimer alone with significant hair regrowth A5=100% hair regrowth)

Case 2: Male patient 44 years old presented with multiple patches of AA and received 12 sessions over 12 weeks there was just a partial response.



A) before treatment



B) After the treatment (the same patch after 12 sessions of excimer alone with partial hair regrowth A3=50% hair regrowth)

DISCUSSION:

This study was performed on 15 patients received their treatment only as one session of excimer laser per week for 3 months

The follow up was made by taking photographs every two sessions for evaluation of the percentage of hair regrowth and calculation of SALT II score difference before and after treatment .

The mean age in this study was 18 years, this study included 10 males (66%) of the sample size while only 5 females (33%) of the sample size with male predominance

These results concur with those that were published by **Bhat et al [8]**, who reported increasment in incidence of AA in men compared to women (2.12:1) and the most of the patients were younger than 40. Additionally, these results concurred **Mahmoudi et al. [9]** whose study on AA patients included (38.1%) females and (61.9%) males. There was a male predominance in their study.

On the other hand, **Manolache and Benea [10]** reported a female predominance as there were 27 female (60%) and 18 male subjects

(40%), and this can be the result of different determination methods and sample sizes **Kasumagić-Halilovic et al.[11]** also reported a female predominance as they found that in the case group there were 36 female (60%) and 24 male subjects (40%).

Most of the cases 93.3%, in the studied group had mild degree lesions (SALT score <25% =S1) most of these cases had less than 5 patches of alopecia (80%). While only 3 cases (20%), had more than 5 patches of alopecia no AT nor AU was included in this study.

These outcomes aligned with those of **Kasumagić-Halilovic et al. [11]** whose study on AA had (76.6%) of patients with unifocal and multifocal Alopecia.

Regarding the length of the intervention this study revealed that the length of the course of therapy required for achieving the treatment in the studied group excimer alone up to 12 weeks.

Regarding the SALT II score difference between before and after treatment, we found that the mean of SALT II score before treatment was 7 and 2 after completion of treatment sessions.

Regarding the complete response to treatment of complete responder (SALT II= 0 after treatment), we recorded 26.7% of the studied group are complete responders (100% hair regrowth) while the non-responders (SALT II before =SALT II after) the studied group recorded a percentage of non-responders (46.7%) hair regrowth =0. The remaining cases showed partial response.

Our findings of complete responders in the studied group 27 % are in agreement with **Nistico et al.**[12] who reported that 2 out of 6 (33%) Nevertheless, his study's small sample size prevented individuals with patchy AA from showing full hair regrowth when treated with excimer alone.

While in contrary to those found by **Al-Mutairi et al.** [13] who reported that Of the 22 lesions on the scalp, 14 (63%) showed total hair regrowth; this may be due to a higher number of sessions (24 sessions maximum) and more frequent sessions (twice/week) in his study.

25% of the complete responders in our study showed a relapse within 6 months of follow-up after cessation of the treatment.this is in agreement with **Al-Mutairi et al.** [13] The issue of recurrence after ceasing the therapy remains a serious worry, as four out of the eleven patients with patchy alopecia of the scalp who responded to laser therapy showed a recurrence of hair loss from the healed areas at six months.

The excimer laser therapy caused erythema, irritation, mild scaling, and hyperpigmentation as adverse effects. Only three people had these negative effects (20%) in this study and generally considered minimal and tolerable even in children. These findings regarding the side effects are in agreement with those found by **Li et al.**[14] throughout the course of the 12-week treatment, no serious side effects were noted. While all patients experienced erythema and hyperpigmentation, ten patients reported

itching, nine reported desquamation, six reported persistent erythema, and three reported pain on the treated side, all patients felt the side effects were manageable and had no effect on their day-to-day activities. Additionally, the results of **Al-Mutairi et al.** [13] on the effects of excimer laser treatment on AA were generally modest and bearable, especially in youngsters. The adverse events in this case included slight skin peeling, erythema, hyperpigmentation, and itching.

CONCLUSIONS:

For mild cases of alopecia areata, excimer laser therapy is a secure and reliable option (S1, S2). However, it is not enough as a monotherapy for more sever cases that require a combination with other lines of topical or systemic treatment.

Conflictsof Interest

The authors report no conflicts of interest.

FUNDING INFORMATION

None declared

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Citation:

Al-Balat, W., Selim Nasralla, A., Samir, M. The Efficacy of Excimer Laser in the Treatment of Alopecia Areata. *Zagazig University Medical Journal*, 2024; (2240-2249): -. doi: 10.21608/zumj.2024.297563.3444