

Efficacy of 308-mm Excimer Laser in patients with alopecia areata

Irfan Ullah Afridi, Mehran Khan, Sehrish, Mah Rukh, Sarbjeet Singh

Department of Dermatology, MTI Khyber Teaching Hospital, Peshawar, Pakistan.

Abstract

Objective: Alopecia areata (AA) is characterized by patchy non-scarring hair loss involving the scalp and other hair-bearing surfaces. This study aims to determine the effectiveness of 308-nm Excimer laser in patients with alopecia areata.

Methods: A total of 168 patients with alopecia areata (within 12 months) were included in the study in a consecutive manner and subjected to 308-nm Excimer laser. Baseline and follow up Severity of Alopecia Tool (SALT) scoring was done to determine the effectiveness of the therapy.

Results: The mean baseline SALT score was 26.4 ± 13.3 which increased to 75.6 ± 12.7 ($p < 0.001$). The mean difference between baseline and follow up SALT score was 49.2 ± 12.7 . According to categories of difference between baseline and follow up SALT scoring, 41.7% were in fair category (11-50) and 58.3% were in excellent category (SALT 51-74). Effectiveness (minimum 50 improvements in SALT from baseline) was recorded in 58.3% of patients. Erythema was the only side-effect noted in our study.

Conclusion: 308-nm Excimer laser is effective in the treatment of alopecia areata and is significantly associated with improvement in baseline SALT score.

Keyword: Alopecia areata; Excimer Laser; Severity of Alopecia Tool; Effectiveness.

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Introduction

Alopecia areata (AA) is considered a T-cell-mediated autoimmune disorder characterized by patchy non-scarring hair loss involving the scalp and other hair-bearing surfaces. Hair loss in this condition occurs by the abrupt discontinuation of hair synthesis, without the primarily destruction of hair follicles. Therefore, AA is a potentially reversible disease.¹

The lifetime risk of AA is estimated to be around 2%. The incidence of more severe forms, such as AA totalis

and AA universalis, is lower, occurring in approximately 3.5 to 30% of all cases.² The frequency of AA in Pakistani population is low but is highly associated with positive family history, atopic dermatitis and other autoimmune disorders.

In alopecia areata, the hair follicle abruptly enters in premature telogen phase in response to an unknown trigger or injury. The hair growth cycle is shortened and repeatedly stalls during anagen, leading to hair loss. The condition can cause significant cosmetic concerns, lower self-esteem and changes in self-image.

According to the main therapeutic guidelines, intralesional corticosteroids are considered first-line therapy in adults with AA involving less than 50% of the scalp.³ However, alopecia areata is usually resistant to therapy; therefore, further investigations into new treatments for the condition are needed. There are

Address or corresponding

Dr. Irfan Ullah Afridi, Associate Professor,
Department of Dermatology,
MTI Khyber Teaching Hospital,
Peshawar, Pakistan.
Ph: +923133993422
Email: drirfanullahafri@gmail.com

several other treatment options which have been proposed for treating alopecia areata of the scalp. Early data with 308-nm excimer lamp is encouraging suggesting that the lamp might be effective for the treatment of alopecia areata. Amongst other treatments for treating AA, platelet rich plasma (PRP) has shown promising results but it lacks large scale studies to determine its effectiveness. The 308-nm excimer light (equivalent to an excimer lamp) is a system that delivers long-wave monochromatic ultraviolet (UVB) radiation, which is known to induce T-cell apoptosis in vitro and has recently been reported to be useful for treating patchy AA in several clinical studies. Some authors have reported a good response rate in 36–40% of study patients. Arakawa et al showed an average improvement of 31.8 points in Severity of Alopecia Tool (SALT) score with use of 308-nm excimer light.²

Some of the studies have shown adverse effects due to the use of 308-nm Excimer laser. The most common adverse effect which has been shown is erythema of the involved area.^{4,5} Recent international literature has confirmed the safety of 308-nm Excimer laser for treating alopecia areata in men, women and children.

The aim of the present research is to study the effectiveness of 308-nm Excimer laser in terms of hair regrowth in treatment of alopecia areata. There is a paucity of evidence in local literature regarding the use of this treatment modality in treatment of alopecia areata in Pakistan. It is an important study as the skin texture and depth of our population is different from that of people in other parts of the world. The results of this study will be shared in local and national dermatology conferences in order to make guidelines for treatment of this condition.

Material and Methods

The present descriptive study was conducted in the Department of Dermatology, Khyber Teaching Hospital, Peshawar, from 5th November 2020 to 5th May 2021. The sampling technique used is consecutive non-probability sampling and the sample size is calculated using the WHO software for sample size

calculation. The parameters used for calculation included: Confidence interval of 95%, margin of error 5%, effectiveness of 87.5%. The sample size is 168.

Inclusion criteria Both genders male and female with age range 18-60 years of age diagnosed as alopecia areata with symptoms appearing within last 12 months were selected in the study.

Exclusion criteria Patients with history of photo-hypersensitivity, female pregnant patients and patients with extensive (more than 3 patches) or atypical alopecia areata (alopecia totalis and alopecia universalis) were excluded from the study.

After approval from hospital ethical committee, all patients meeting the inclusion criteria were included in the study. Detailed history was taken from patients regarding the condition of scalp. The onset of alopecia, duration, remission, site, distribution, timing, hair loss frequency, aggravating and relieving factors and any previous treatment. Past-history included any associated conditions, use of steroids, history of contact dermatitis, pregnancy (for female patients), history of any allergy or photosensitivity, family history and thyroid problems. Patients were seen in Out-Patient Department (OPD). Pre-treatment SALT score was calculated. Patients underwent phototherapy with 308-nm Excimer laser in sessions of once every 2 weeks and each session lasted up to 10 minutes. The 2-weekly sessions continued for a period of 8 weeks. At the end of 8 weeks, post-treatment SALT score was calculated for every patient.

The patients were irradiated along the midline of the scalp with a 308-nm excimer light (TheraBeam UV308; Ushio, Tokyo, Japan) at 2 weeks interval for total of 4 sessions. The treatment began at a radiation dose of 200 mJ/cm² and was increased in 50-mJ/cm² steps. The maximum dose ranged between 250-600 mJ/cm² depending on patient scalp thickness. At the end of fourth session of phototherapy, post-treatment SALT score was measured for all patients.

The severity of Alopecia Tool (SALT) score was then

compared with each patient's pre-treatment score and the difference between the two values was graded.

The data was entered in and analyzed using Software for Statistics and Data Science ver. (Stata; StataCorp). Quantitative variables like age, duration since onset of AA was presented as Mean and Standard deviation (SD). Qualitative variables were presented as frequency and percentages (like gender and outcome of therapy). Outcome was stratified among the age, gender and autoimmune disease to see effect modification. Chi-square test was applied for effect modification. Pre and post- treatment SALT scores were compared with paired t-test. P-value of <0.05 was considered as statistically significant.

Results

The study was conducted on 168 patients (males; 138 and females; 30) with alopecia areata. The mean age of the sample was 43.7 ± 7.8 years. Mean duration of alopecia was 8.7 ± 2.1 months.

History of autoimmune diseases was recorded in 31 patients.

The mean baseline SALT score was 26.4 ± 13.3 which increased to 75.6 ± 12.7 ($p < 0.001$). The mean difference between baseline and follow up SALT score was 49.2 ± 12.7 . According to categories of difference between baseline and follow up SALT scoring, 41.7% were in fair category (11-50) and 58.3% were in excellent category (SALT 51-74).

As per operational definitions, the effectiveness (minimum 50 improvements in SALT from baseline) was recorded in 58.3% of patients.

The treatment was more effective in age group 30-40 years (66.1%). It was equally effective in males and females (58.7%). It was more effective in patients with short duration of disease i.e. 59.6% in disease of less than 9 months.

Erythema is the only side-effect seen in our study.

Discussion

Our findings demonstrated that a 308-nm excimer lamp is an effective treatment for AA. It offers targeted irradiation of the affected areas, while preserving the surrounding normal skin. In our study, we observed promising results with the monochromatic excimer lamp, which is a more cost effective alternative to the laser therapies used for treating AA.

In this study, we successfully treated 58.3% of AA cases, with most of them needed approximately four sessions of 308-nm excimer lamp therapy. The short session duration and targeted exposure provided significant advantage. Our results indicated that this treatment is particularly beneficial for those with a single AA area, as it promotes effective hair growth.

Recent case reports and clinical trials have shown the 308 nm Excimer laser as an effective and safe treatment option for patients who do not respond to conventional therapies. This laser system emits high doses of long-wave monochromatic UVB radiation, facilitating hair regrowth. The first report of use of an Excimer laser was back in 2004, describing two patients with scalp AA who achieved thick and uniform regrowth after a 9 to 11 week period of weekly xenon chloride Excimer laser therapy.⁶ Since then, only 4 additional small studies of adults and children have been published. In these reports, the Excimer laser appears to produce better outcomes for AA of the scalp compared to AA affecting the beard, extremities, alopecia universalis or totalis.^{7,8} Studies have shown, complete regrowth of hair in 60-70% of patients with refractory AA. Most studies compared the treated area with a control area, with the control area not showing significant growth of hair in any study.^{9,10} Additionally, the Excimer laser demonstrated good patient tolerability, with only mild to moderate erythema and hyperpigmentation being the most common adverse effect. A study on a 308-nm Excimer laser device also has shown promising results in which four out of eight patients gained complete hair regrowth after a three weekly treatment on average.¹¹

Since excimer lamp produces high energy radiation in small period of time, there is a high risk of erythema, blister formation and crusting. However, in our study, erythema was the only side effect observed. Based on our results, the 308-nm Excimer laser appears to be a promising treatment option for AA. Further studies with a larger patient cohort is needed to conclude definitive results regarding its long term efficacy.

Conclusion

The 308-nm Excimer laser has shown effectiveness in the treatment of alopecia areata and is significantly correlated with improvement in baseline SALT score. We recommend conducting further studies with larger sample sizes and multicenter studies to better report the effectiveness of 308-nm Excimer laser while considering potential effect modifiers in patients with AA.

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.

References

1. Melo OF, Dutra TBS, Baggieri V, Tortelly YD. Intralesional betamethasone as a therapeutic option for alopecia areata. *Anais Brasileiros De Dermatologia*. 2018;**93**(2):311-2.
2. Arakawa Y, Nomiyama T, Katoh N. Three hundred and eight nanometer excimer light therapy for alopecia universalis that is resistant to other treatments: A clinical study of 11 patients. *J Dermatol*. 2016;**43**(12):1412-6.
3. Shahzadi N, Pal SS, Asad F, Rani Z, Khurshid K. Frequency of autoimmune disorders in patients of alopecia areata. *J Pak Assoc Dermatol*. 2016;**26**(2):112-7.
4. Sardesai VR, Prasad S, Agarwal TO. A study to evaluate the efficacy of various topical treatment modalities for alopecia areata. *Int J Trichol*. 2012;**4**(4):265-70.
5. Shapiro J. Current treatment of alopecia areata. *J Invest Dermatol Symposium Proceedings*. 2013;**16**(1):S42-4.
6. Satho Y, Kawada A. Action spectrum for melanin pigmentation to ultraviolet light, and Japanese skin typing. In: Fitzpatrick TB, Wick MM, Toda K, editors. *Brown melanoderma. Biology and disease of epidermal pigmentation*. Tokyo: University of Tokyo Press; 1986. pp. 87–95
7. Gundogan C, Greve B, Raulin C. Treatment of alopecia areata with the 308-nm xenon chloride excimer laser: case report of two successful treatments with the excimer laser. *Lasers Surg Med*. 2004;**34**(2):86-90.
8. Zakaria W, Passeron T, Ostovari N, Lacour JP, Ortonne JP. 308-nm excimer laser therapy in alopecia areata. *J Am Acad Dermatol*. 2004;**51**(5):837-8.
9. Al-Mutairi N. 308-nm excimer laser for the treatment of alopecia areata. *Dermatol Surg*. 2007;**33**(12):1483-7.
10. Al-Mutairi N. 308-nm excimer laser for the treatment of alopecia areata in children. *Pediatr Dermatol*. 2009;**26**(5):547-50.
11. Raulin C, Gundogan C, Greve B, Gebert S. Excimer laser therapy of alopecia areata-side-by-side evaluation of a representative area. *J Dtsch Dermatol Ges*. 2005;**3**(7):524-6.