

DOI: 10.4274/jtad.galenos.2023.54154

J Turk Acad Dermatol 2023;17(1):18-21

# Low Dose UVA-1 Treatment in Atopic Dermatitis: Does Treatment Response Depend on Age and Gender?

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## ABSTRACT

**Background:** UVA-1 is one of the anti-inflammatory treatment alternatives for atopic dermatitis.

**Materials and Methods:** The aim of this study is to evaluate the efficacy of low dose UVA-1 treatment in atopic dermatitis. The patient files of the 19 atopic dermatitis patients who received low dose UVA-1 (10-15 J/cm<sup>2</sup>, 5 days a week) treatment were analysed retrospectively.

**Results:** The complete remission rate was 84%. The mean of the cumulative dose was 236.05 J and the mean of treatment sessions was 16.1. Mann-Whitney U test showed that there is no relationship between age and treatment response (p=1.00). Fischer's exact test showed that there is no relationship between gender and treatment response (p=0.582).

**Conclusion:** It was concluded that low dose UVA-1 is an efficacious treatment for atopic dermatitis regardless of the patient's age and gender. A lower cumulative dose with a greater number of treatment sessions is required for low dose UVA-1 compared to high dose UVA-1 in the treatment of atopic dermatitis.

**Keywords:** Atopic dermatitis, Low dose, Phototherapy, UVA-1

## Introduction

Atopic dermatitis is one of the most commonly encountered chronic inflammatory skin diseases. The treatment of atopic dermatitis has three crucial steps: avoiding the triggering factors, increasing the barrier function of the skin and anti-inflammatory treatment. Phototherapy, including narrow band ultraviolet-B (nbUVB) and ultraviolet-A1 (UVA-1), is one of the anti-inflammatory treatment alternatives [1,2]. There is limited data in the literature regarding the use of UVA-1 in the treatment of atopic dermatitis. The aim of this study is to evaluate the treatment efficacy of low dose UVA-1 in atopic dermatitis; and to determine the effect of age and gender on the treatment response.

## Materials and Methods

### Inclusion Criteria and Data Acquisition

Patients with the definitive diagnosis of atopic dermatitis, who have received UVA-1 phototherapy between January 2005 and November 2020, at the phototherapy unit of Istanbul University-Cerrahpasa, Cerrahpasa Medical Faculty, Department of Dermatology and Venereology were included in this retrospective study. The treatment indications for UVA-1 were having an acute attack, generalised skin eruption and thick infiltrative plaques. Patients with photosensitive disorders; pregnant and lactating patients; and those who cannot abide with the treatment protocol were excluded from this study. The age, gender, number of treatment sessions received, previous



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**Received:** 23.11.2022 **Accepted:** 14.02.2023

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treatment modalities, comorbid diseases, maximum dose reached, cumulative dosage and the treatment response were noted from the patient files.

### Treatment Parameters

Low dose UVA-1 treatment, with doses ranging from 10-15 J/cm<sup>2</sup>, was given to every patient 5 days per week. (Waldmann Medizintechnik, UV7001). The approval of İstanbul University-Cerrahpasa, Cerrahpasa Medical Faculty Ethics Committee was taken before the initiation of the study (03.12.2020-158710).

### Statistical Analysis

SPSS version 21 was used for the statistical analysis. Mann-U Whitney and Fisher's exact tests were used for the statistical analysis.

## Results

### Demographics

A total of 19 patients were included in this study: 10 females and 9 males. The mean age of the patients was 28.1 years; the youngest patient was 11 years old and the eldest patient was 60 years old. Comorbid asthma was present in three patients, hypothyroidism in two patients, familial mediterranean fever in two patients and Netherton syndrome in two patients.

### Treatment Response

The mean number of total treatment sessions was 16.1; maximum of 27 and minimum of 10. The mean cumulative dose of 236.05 J, minimum cumulative dose of 100 J and a maximum cumulative dose of 600 J were reached. Sixteen of the patients reached full remission whereas treatment modality was changed in three patients due to unresponsiveness.

Mann-Whitney U test was used to reveal that there is no relationship between age and treatment response ( $p=1.00$ ). Fischer's exact test was used to reveal that there is no relationship between gender and treatment response ( $p=0.582$ ).

## Discussion

Atopic dermatitis is an inflammatory disease. Phototherapy is a helpful treatment for atopic dermatitis via photoimmunosuppression and photoimmunomodulation. Phototherapy modalities that have been previously used in the treatment of atopic dermatitis are nbUVB (311-313 nm), broad band UVB (290-320 nm), UVB, Goeckerman regimen, excimer laser (308 nm), UVA, UVA-1 (340-400 nm), psoralens plus UVA and combined UVA/UVB (280-400 nm). Previously, a systematic review has reached the conclusion that medium dose UVA-1 is the most effective phototherapy modality in the treatment of acute flares of atopic dermatitis, whereas, UVB is better at the chronic disease. Due its greater wavelength, UVA-1 penetrates deeper into the dermis and superficial vessels compared

to UVB; therefore it suppresses the activity of Langerhans cells in the skin. It is effective in the treatment of acute flares in particular. It was shown that high dose UVA-1 (80-130 J/cm<sup>2</sup>) and medium dose UVA-1 (40-80 J/cm<sup>2</sup>) are equally effective and superior to low dose UVA-1 (<40 J/cm<sup>2</sup>) in the treatment of atopic dermatitis in fair skinned individuals [3,4,5,6]. High dose UVA-1 is more effective than medium dose UVA-1 in dark-skinned individuals [7]. Due to increased heat emitted from the high dose UVA-1 lamps, treatment intolerances have been observed. This led to the introduction of cold-light UVA lamps that filter the infrared radiation [6]. UVA-1 and cold light UVA-1 therapies offer prolonged therapeutic benefits due to the decrease in eosinophilic cationic protein and soluble interleukin-2 and interleukin-4 receptors in the sera of patients, compared to UVB therapy. Cold light UVA-1 is superior to conventional UVA-1 treatment in terms of both anti-inflammatory efficacy and side effects since it produces less heat-induced blood flow to the irradiated area [8,9]. All available UVA-1 modalities are compared in Table 1. The therapeutic effects of UVA-1 phototherapy are prolonged up to 3 months [10].

High dose UVA-1 has been used as an efficacious treatment modality for acute exacerbations of atopic dermatitis since 1992 [11,12]. A multicenter trial has shown that high dose UVA-1 treatment is superior than topical high potency corticosteroids in the treatment severe atopic dermatitis; and it can be used as a mono-therapy in the treatment of acute exacerbations [13]. A recent study on the Asian population also investigated the efficacy of high-dose UVA-1 therapy on acute exacerbations of atopic dermatitis. A total of 16 patients were treated with an average cumulative dose of 968.8 J/cm<sup>2</sup> with an average of 9.7 treatment sessions of high dose (100 J/cm<sup>2</sup>) UVA-1 phototherapy. Nine (56.3%) of these patients had complete and five (31.2%) of these patients had partial remission [14]. In our study, on the caucasian population, a mean cumulative dose of 236 J/cm<sup>2</sup> was reached on an average of 16.1 treatment sessions. Sixteen of the patients (84.2%) reached complete remission. Compared to high dose UVA-1, a lower average cumulative dose is reached in low dose UVA-1 treatment; however, the mean number of treatment sessions is more in low dose UVA-1 compared to high dose UVA-1 treatment. The two modalities are compared in Table 2.

**Table 1. The comparison of different UVA-1 modalities [3,4,5,6,7,8,9]**

Treatment modality	Dose (J/cm <sup>2</sup> )	Efficacy
High dose UVA-1	80-130	Standard
Medium dose UVA-1	40-80	As efficacious as high dose
Low dose UVA-1	10-15	Less efficacious than high dose
Cold light therapy	45	More efficacious than high dose

UVA: Ultraviolet-A-1

**Table 2. Cumulative dose and average treatment sessions of high dose vs low dose UVA-1 [14]**

Modality	Treatment dose (J/cm <sup>2</sup> )	Cumulative dose (J)	Average number of treatment sessions
High dose UVA-1	100	968.8	9.7
Low Dose UVA-1	10-15	236	16.1

UVA: Ultraviolet-A-1

The medium dose UVA-1 treatment was found to be equally effective with high dose UVA-1 treatment [3-6]. A recent study on medium dose UVA-1's efficacy on acute attacks of atopic dermatitis has shown that medium dose UVA-1 (45 J/cm<sup>2</sup>) therapy improves the quality of life of atopic dermatitis patients by decreasing the severity of disease and exerting antipruritic effects [15]. Medium dose UVA-1 cold light therapy (45J/cm<sup>2</sup>), when given for 4 weeks, was found to be superior than conventional medium dose UVA-1 therapy given for 3 weeks [16]. When compared to medium dose UVA-1 (50 J/cm<sup>2</sup>), low dose UVA-1 (10 J/cm<sup>2</sup>) was found to be less effective on acute exacerbations of atopic dermatitis, given 5 times a week for 3 weeks [17]. Later, it was reported that even doses as low as 30 J/cm<sup>2</sup> were sufficient to control acute attacks of atopic dermatitis and the cumulative dose was the important treatment parameter that determines the treatment efficacy [18].

To our knowledge, our patient series was the first study to evaluate the efficacy of low dose UVA-1 treatment on acute attacks of atopic dermatitis, without comparing it to other dosing regimens. We have reported a complete remission rate of 84%. The mean number of treatment sessions was greater compared to higher dose UVA-1. Furthermore, our study was the first study to reveal that treatment response to UVA-1 in atopic dermatitis patients was independent of both age and gender.

### Study Limitations

The limited sample size and the lack of Scoring Atopic Dermatitis scores are the main limitations of this study.

### Conclusion

It was concluded that low dose UVA-1 is an efficacious treatment for atopic dermatitis regardless of the patient's age and gender. A lower cumulative dose with a greater number of treatment sessions is required for low dose UVA-1 compared to high dose UVA-1 in the treatment of atopic dermatitis.

### Ethics

**Ethics Committee Approval:** The approval of Istanbul University-Cerrahpasa, Cerrahpasa Medical Faculty Ethics Committee was taken before the initiation of the study (03.12.2020-158710).

**Informed Consent:** Retrospective study.

**Peer-review:** Externally and internally peer-reviewed.

### Authorship Contributions

Surgical and Medical Practices: D.Ö., T.K.Ü.U., Concept: D.Ö., T.K.Ü.U., Z.K., Design: D.Ö., T.K.Ü.U., Z.K., Data Collection or Processing: D.Ö., T.K.Ü.U., Analysis or Interpretation: D.Ö., N.C., Z.K., Literature Search: D.Ö., Z.K., Writing: D.Ö., Z.K.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study received no financial support.

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