ORIGINAL ARTICLE

Experience with UVA1 phototherapy in treatment of skin diseases in Kuwait

Hanan Boabbas, PhD, Jihan Rajy, MD, Haneen Alraqim, PhD

As'ad Al-Hamad Dermatology Center, Sabah Hospital, Kuwait

ABSTRACT

Background: Very few studies on UVA1 radiation have been published to date, and none have been conducted in the Middle East. Such studies have mainly been from EU, along with several from the USA. Additionally, only a few studies have reported the use of UVA1 radiation in persons with highly pigmented skin.

Purpose: To evaluate the use of UVA1 in all patients treated in Kuwait from 2004, and to compare the effectiveness of high-dose, intermediate-dose and low-dose protocols on the treatment of morphea.

Methods: A retrospective study of 35 patients with skin types IV-V who underwent UVA1 treatment at Sabah Hospital in Kuwait between 2004 and 2013.

Results: We obtained the treatment doses for all patients and found that seven patients showed no response (20%); 5 patients showed a poor response (14.3%); eight patients showed a fair response (22.9%); eight patients (22.9%) showed a moderate response; and seven patients (20%) showed a good response.

Among the morphea cases, three patients showed no response (13%); 3 patients (13%) showed a poor response; 5 patients (21.7%) showed a fair response; seven patients (30.4%) showed a moderate response; and five patients (21.7%) showed a good response.

Conclusion: The results of our study indicated that patients who received high-dose UVA1 therapy exhibited better responses than those who received low-dose UVA1 therapy (presenting poor to fair responses).

KEY WORDS: Phototherapy, ultraviolet A1, UVA1, morphea

INTRODUCTION

Phototherapy is the use of UV light for the treatment of skin disease. UVA1 (340-400nm) has been used successfully, with a high tolerability, to treat many inflammatory and neoplastic diseases, such as atopic dermatitis, cutaneous T-cell lymphoma, and scleroderma.[1-7] UVA1 rays contain less energy than UVA2 and UVB rays, but they penetrate deep into the reticular layer of the dermis, where various cell types in blood vessels and connective tissues are affected, such as T and B lymphocytes, fibroblasts, dendritic cells and immature mast cells.[8,9] UVA1 radiation can induce T-cell apoptosis if active oxygen molecules are present, and it also has the ability to reduce the number of Langerhans cells and mast cells in the dermis.[6,10,11]

UVA1 radiation was first artificially produced from a special filtered metal halide lamp in 1981 by Mutzhas,[12] who used it to study the physiologic cutaneous effect of UVA alone. Over time, UVA1 radiation began to be used for the

Correspondence: *Dr. Hanan Boabbas, PhD, Head of Medical photophysics Lab, Phototherapy Unit, Asaad Al-Hamad Dermatology Center Sabah Hospital, Kuwait. Tel: +96597555160 e-mail: hanan_buabbas@yahoo.com*

diagnosis of photo-provocation of conditions such as polymorphic light eruption and as a novel treatment modality for certain inflammatory dermatoses.[13]

Few studies have reported the application of UVA1 radiation in highly pigmented skin.[14] The purpose of this study was to evaluate the experience of using UVA1 radiation at our institution since 2004, and to highlight the treatment of many skin diseases with UVA1 radiation. Moreover, we compared the effectiveness of high-dose, intermediate-dose and low-dose protocols for the treatment of morphea.

PATIENTS AND METHODS

Patients

We conducted a retrospective study of all patients treated with UVA1 radiation at the phototherapy unit of Asaad Al-Hamad Dermatology Center of Sabah Hospital in Kuwait between 2004 and 2013 (approximately 9 years). This center is the only facility in Kuwait to offer UVA1 treatment. The following data were collected for all patients: age, sex, whether they were Kuwaiti (K)/Non-Kuwaiti (N.K), skin type, diagnosis, duration of disease, number of treatment sessions, family history, frequency of treatment (3/W or 5/W), treatment protocol (low, intermediate or high dose), total cumulative dose and treatment response.

The patients were treated with low-dose (less than 30 J/cm^2), intermediate-dose (40-70 J/cm^2) or high-dose (80-90 J/cm^2) UVA1 radiation. The treatment protocols varied depending on the skin condition and the compliance of the patient.

Radiation Source

UVA1 irradiation was delivered with a full-body high-output Dermalight-Medisun 6311 K cabinet (Schulze and Böhm GmbH, Hürth, Germany; Fig. 1) equipped with 24 high-pressure metal halide lamps (Dermalight Ultra 1; Dr. Hönle AG, Gräfelfing, Germany) with 400 watts of power each (Fig. 1). The spectrum of the emitting wavelength mainly ranged from 315 nm to 450 nm (Fig. 2). Irradiance was measured directly using a calibrated UVA radiometer (UVA-meter, 0020, Dr Hönle AG, Martinsried, Germany) centered on the protection filter in the center of each lamp field.

Fig. 1 Full-body high-output Dermaligh-Medisun 6311 K cabinet.

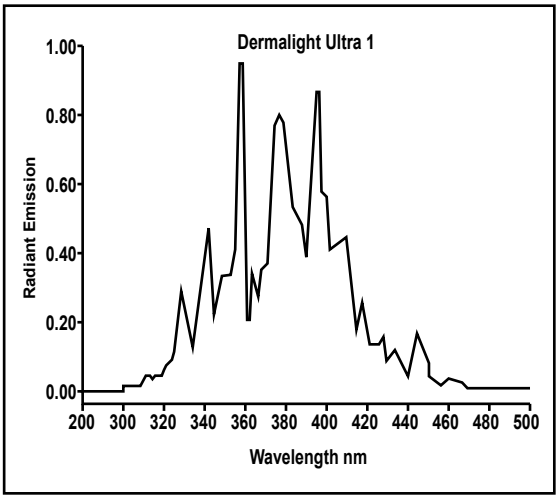

Fig. 2 Emission spectrum of the Dermalight Ultra 1 (Dr Hönle AG, Gräfelfing,Germany).
This graph is taken from the Dermaligh-Medisun 6311 K instruction manual.

Clinical Evaluation

Cutaneous involvement before and after UVA1 phototherapy was compared by the same physician. The efficacy of phototherapy was assessed using the following clinical improvement scale: 1-poor response (less than 25% improvement); 2-fair response (26%-50% improvement); 3-moderate response (51-75% improvement); and 4-good response (76-100% improvement). This scale was used in previously published studies to assess the efficacy of UVA1 therapy.[15]

Statistical Analysis

Microsoft Excel 2007 and SPSS version 15.0 (2006 SPSS Inc. Chicago, USA) were used for the statistical analysis. The data are expressed as the mean and standard deviation (±SD) (MIN-MAX).

RESULTS

A total of 49 patient records included in the Dermalight-Medisun software were reviewed.

Fourteen patients (28.6%) were excluded from this study, eight because treatment was terminated after less than 15 sittings, two because they were still under treatment at the time of the study, and four due to other reasons.

The remaining 35 patients, with different skin disorders, were included in this study (see Table 1). These patients were referred to the phototherapy unit of Asaad Al-Hamad Dermatology Center, Al Sabah Hospital, Kuwait. There were 12 males, and 25 females of mean age 38±19 years (range 8-80 years). Eighteen of the patients were Kuwaiti (51.4%), and seventeen were Non Kuwaiti (48.6%). The skin type was only reported for eight patients: one patient exhibited Fitzpatrick skin type III, and seven patients exhibited Fitzpatrick skin type IV.

Table 3 Diagnosis of patients with different skin diseases treated with UVA1

Diagnosis	Number of patients
Cutaneous T-cell lymphoma	3
Morphea	23
Pityriasis lichenoides chronica	1
Scleredema	4
Necrobiosis lipoidica diabeticorum	3
M.F + lymphomatoid papulosis	1
Total	**35**

The duration of the patients' disorders ranged from 4 months to more than 20 years. Four patients (11.4%) received other ultraviolet phototherapies (narrow band UVB or PUVA therapy).

Patient Diagnosis

The enrolled patients presented with different disorders that had been treated by UVA1 radiation, such as morphea, scleredema, necrobiosis lipoidica, PLC and cutaneous T-cell lymphoma. The diagnoses of all patients (35 patients) are listed in Table 1.

Twenty-four patients had a negative family history (68.6%), and 8 (22.8%) patients had a positive family history. The family history was not available for the other three patients (8.6%).

Treatment Regimens

Fourteen patients (40%) underwent a low-dose regime; eighteen patients (51.4%) underwent an intermediate-dose regime; and 3 (8.6%) patients underwent a high-dose regime.

Eleven patients received treatment three times per week (31.4%), and 24 patients received treatment five times per week (68.6%).

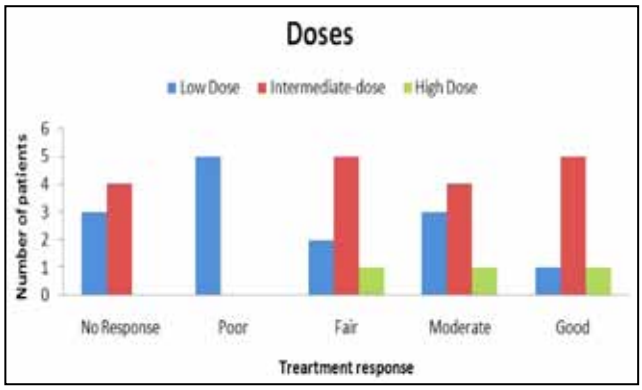

Fig. 3 Responses to low-, intermediate- and high-dose UVA1 treatment.

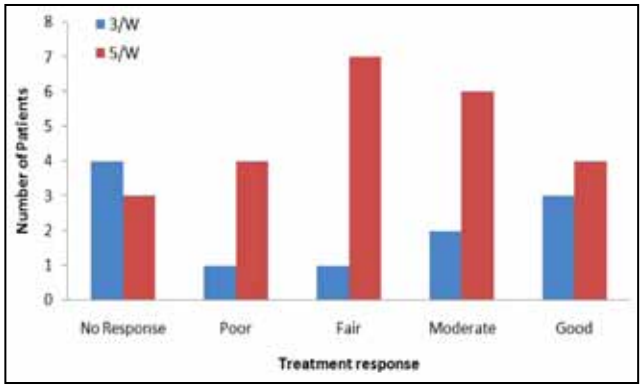

Fig. 4 Patient responses to treatment 3 and 5 times a week.

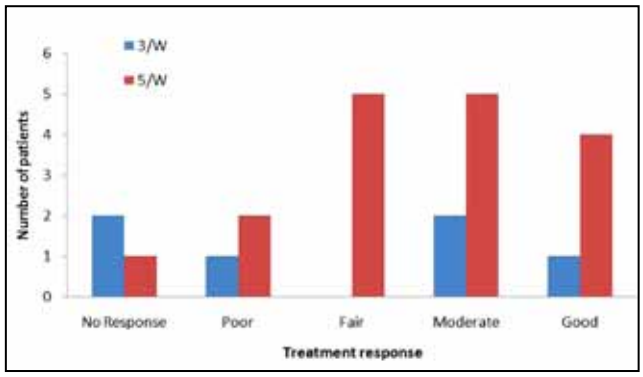

Fig. 5 Responses of morphea patients to treatment 3 and 5 times a week.

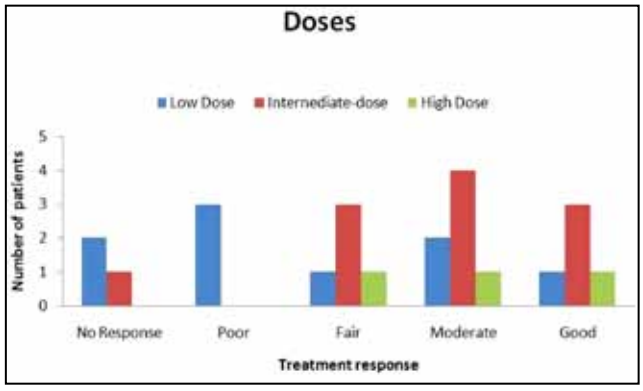

Fig. 6 Response of morphea patients to low-, intermediate- and high-dose UVA1 treatment.

Treatment Response

The 35 patients received 15-60 sessions (mean 42.1±13.4), with a total cumulative dose of UVA1 radiation ranging from 397 to 3,565 J/cm^2 (mean: 1,861.5±927).

Seven patients (20%) showed no response; 5 patients (14.3%) showed a poor response; eight patients (22.9%) showed a fair response; eight patients (22.9%) showed a moderate response; and seven patients (20%) showed a good response (Figs. 3-4).

Clinical Response of Morphea Patients to UVA1 Therapy

Morphea was the most common skin disorder to be treated with UVA1 therapy in Kuwait (n=23, 53.5%). In this study there were eight males and 15 females with an average age of 36±19 years (range: 8-80 years) were treated for morphea.

The nine patients treated with low-dose therapy underwent a mean number of sessions of 39±12 (range: 22 - 54), receiving a mean cumulative dose of 1,116±371 J/cm^2 (range: 570-1, 590 J/cm^2). The eleven patients treated with intermediate-dose therapy underwent a mean number of sessions of 43±14 (range 15-60), receiving a mean cumulative dose of 2300±865 J/cm^2 (range: 620-3,175 J/cm^2). The three patients treated with high-dose therapy underwent a mean a number of sessions of 55±4.4 (range: 52 - 60), receiving a mean cumulative dose of 3,042±635 J/cm^2 (2,335-3,565 J/cm^2).

Twenty-four patients had a negative family history (68.6%), and 8 (22.9%) patients had a positive family history;. The family history was not available for the other three patients (8.5%).

Three patients (13%) showed no response; 3 patients (13%) showed a poor response; 5 patients (21.7%) showed a fair response; seven patients (30.4%) showed a moderate response; and five patients (21.7%) showed a good response (Figs. 5-6).

DISCUSSION AND CONCLUSIONS

In our study, 35 patients with different skin diseases (morphea, scleredema, cutaneous T-cell lymphoma, necrobiosis lipoidica diabeticorum, PLC and T-cell lymphoma with lymphomatoid papulosis) who received courses of UVA1 therapy were retrospectively reviewed. Fourteen patients (40%) received low-dose UVA1 therapy; 18 patients (15.4%) received intermediate-dose UVA1 therapy; and 3 patients (8.6%) received high-dose UVA1 therapy. Of the 35 patients enrolled in this study, 7 (20%) showed no response; 13 (37.14%) showed a poor to fair response (less than 25% to 50% improvement); and 15 patients (42.86%) showed a moderate to good response (51-100% improvement). These findings support the conclusion of Tuchinda et al.[15] and Rombold et al.[1] that UVA1 phototherapy is a useful treatment option for a variety of skin conditions.

We also compared the response rates based on the treatment protocol. Of the 14 patients who received low-dose UVA1 therapy, 3 (21.43%) showed no response; 7 (50%) showed a poor to fair response; and 4 (28.57%) showed a moderate to good response. Of the 18 patients who received intermediate-dose UVA1 therapy; 4 (22.22%) showed no response; 5 (27.78%) showed a fair response; and 9 (50%) showed a moderate to good response. Of the 3 patients who received high-dose UVA1 therapy, one (33.33%) showed a fair response, and 2 (66.67%) showed a showed moderate to good response.

Of the 23 morphea patients, 12 (52.1%) showed a moderate to good response; 8 (33.7%) showed a poor to fair response; and 3 (13%) showed no response. Moderate to good responses were observed in 33.3% of the patients treated with low-dose therapy, 58% of the patients treated with intermediate-dose therapy and 66.6% of the patients treated with high-dose therapy. Therefore, the intermediate-dose and high-dose UVA1 therapies were superior to low-dose UVA1 therapy. This result confirms the findings of Stege et al.[16] who compared high-dose and low-dose UVA1 therapy in patients with scleroderma and found that high-dose UVA1 therapy significantly reduced skin thickness and significantly increased elasticity. Tuchinda et al[15] also found that intermediate-dose and intermediate-to-high-dose UVA1 therapies were superior to low-dose therapy. Rombold et al.[1] reported an improvement of sclerosing skin diseases with the application of intermediate-dose UVA1 therapy. Nevertheless, other studies have reported excellent results in the treatment of morphea with low-dose UVA1 therapy.[4,5,17]

In this retrospective study, four patients with scleredema adultorum were treated with UVA1 therapy (two with a low dose and two with an intermediate dose). The two patients who received low-dose UVA1 therapy showed a poor response (50%), and the two patients who received intermediate-dose UVA1 therapy showed a fair response (50%). However, one previous study[18] indicated that two scleredema adultorum patients treated with low-dose UVA1 therapy showed a marked clinical improvement. Another study[15] found moderate to good responses in four of five patients (80%) with scleredema adultorum

treated with low-dose UVA1 therapy. Rombold et al[1] reported one patient with scleredema adultorum showing marked improvement of the skin, and two showing slight improvement of the skin under intermediate-dose UVA1 therapy.

In our study, two patients with T-cell lymphoma exhibited good responses to intermediate-dose UVA1 therapy, while one showed no response. Zane et al.[7] reported complete clearance of T-cell lymphoma in 11/13 patients treated with high dose UVA1 irradiation. Another study[1] recorded good results of intermediate-dose UVA1 therapy in seven patients with T-cell lymphoma.

Three patients with necrobiosis lipoidica (NL) were treated with UVA1 therapy in this study. One of these patients received intermediate-dose UVA1 therapy and showed no response. While, two patients received low-dose UVA1 therapy, one of whom exhibited a fair response, and the other exhibited a moderate response. Beattie et al.[19] reported 6 patients with NL who underwent variable number of sessions of UVA1 therapy. NL resolved completely in one patient; two patients showed moderate improvement; two patients showed minimal improvement; and the remaining patient showed no improvement. Therefore, these researchers reported that UVA1 therapy may be beneficial for the treatment of NL as an adjuvant therapy to topical corticosteroids or as a second-line alternative to other phototherapies and that it may result in a superior outcome in a high proportion of patients.

Although this study was limited by the small number of patients in each disease category, its retrospective design and subjective assessment of disease improvement led to the conclusion that UVA1 therapy is beneficial for a number of skin diseases.

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