LETTER TO THE EDITOR

Daylight photodynamic therapy for actinic keratoses in São Paulo, Brazil

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To the Editor,

There have been several studies about daylight photodynamic therapy (D-PDT) for actinic keratoses (AKs); however, all of them have been performed in Europe. Until now, there have been no studies about D-PDT on other continents.

The aim of this study is to present the initial results of a study of the efficacy and safety of D-PDT for AKs in São Paulo, Brazil, and to validate this method in that city.

MATERIALS AND METHODS

Fourteen patients (10 women and 4 men) with multiple AKs on the face (at least six lesions) were selected. The patients selected had AKS of grades I (thin lesions, slightly palpable) or II (moderately thick, easily felt) according to Olsen *et al.* (1). Patients with thicker lesions (grade III) were excluded. None of the selected patients had received any treatment in the previous 6 months. The study was approved by the local ethical committee at the University of São Paulo.

After informed consent, patients were photographed, and the lesions were mapped and counted.

As recommended by the international consensus on D-PDT published in 2011 by Wiegell *et al.* (2), the treatment method consisted of light curettage and application of a non-physical SPF30 sunscreen (3). Fifteen minutes later, 16% methyl ester of 5-aminolaevulinic acid (MAL) in a cream base (Metvix®, Galderma S.A., Hortolândia, Brazil) was applied in a thick layer over the lesions and a thinner one on the whole face. The cream was left on the face with no occlusion for 30 min, and after that, the patients were instructed to expose themselves to sunlight in the hospital garden for 60 to 90 min.

Immediately after exposure, the patients returned to the department of dermatology, where their faces were wiped clean and the sunscreen reapplied. They also answered a questionnaire about pain during the treatment.

The patients were evaluated 1 month after treatment; the remaining lesions were counted and photodocumented.

The patients who did not achieve a good response were submitted to repeated D-PDT sessions with monthly follow-up, with a maximum of three treatments.

This study was conducted between August 2012 (winter in Brazil) and May 2013 (autumn), and all of the patients were exposed to natural daylight between 8:30 AM and noon.

The measurement of incoming solar radiation during the daylight exposure was made at surface level (horizontal). The 5-min average values of this radiation were integrated for the exposure time. Environmental radiation was measured at the micrometeorological platform located on top of a four-story building in the University of São Paulo campus in the western part of São Paulo city (23.4°S, 46.7°W, 742 meters above the mean sea level). The

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Table 1. Number of lesions before and after the last session of daylight photodynamic therapy

Number of lesions before treatment	Number of lesions after treatment	Number of sessions	Percentage reduction
12	2	1	83
18	2	2	89
25	4	1	84
8	1	1	87
24	4	3	83
29	7	1	75
18	2	1	89
6	0	2	100
26	3	1	89
29	4	1	86
10	0	1	100
6	0	1	100
14	2	1	86
22	10	2	55

equipment used was a pyranometer (model PBW, Eppley Laboratory, Newport, RI, USA), which measures solar radiation between 0.285 μm and 2.8 μm.

All of the patients were followed for 3 months after the last session of D-PDT.

Patients were evaluated for clinical improvement of photodamage, lesion count and level of discomfort.

RESULTS

All of the patients finished the study. Ten of them were treated with only one session of D-PDT; three of them had two sessions, and only one patient had three sessions.

None of the patients had severe side effects. The only observed side effect was a light erythema noted in the first days after treatment.

Clinical evaluation

All of the 14 patients showed a decrease in the number of lesions. The percentage of improvement varied between 55% and 100% (Table 1), with a mean 86% reduction in the number of AKs (grades I and II) (Fig. 1).

When we consider only the patients who received a single session of D-PDT, the average reduction in AKs was 87.9%.

After 3 months of treatment, no recurrence was observed.

Pain score

The patients considered the D-PDT to be a non-painful method. The mean score of pain was 2 on a visual analogue scale (0 to 10).

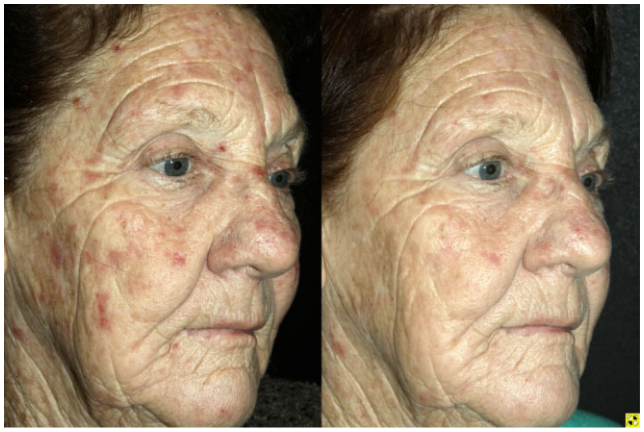

Fig. 1. Before and after daylight photodynamic therapy for multiple actinic keratoses on the face.

The patients who were previously treated with conventional PDT (with MAL and irradiation with red LED light at 635 nm) considered D-PDT to be more tolerable.

Meteorological data

The mean solar radiation was 28.25 J/cm^2 (range 7.9–45.3). There was no relationship between these data and the clinical outcome, as even a patient who received 7.9 J/cm^2 obtained 100% reduction in AKs after a single treatment.

DISCUSSION

Conventional PDT is an efficient method for treating AKs and field cancerization, with a high response rate and an excellent cosmesis (4). The main disadvantages are the pain involved and the time consumed.

In 2008, Wiegell *et al.* presented D-PDT, a new PDT technique, using sunlight instead of artificial illumination (5). This new method shows similar results to conventional PDT without the associated pain. Since then, other European studies have shown the same response: clinical improvement without concomitant pain (3, 6, 7).

Our study corroborates the previous European studies on D-PDT for AKs. When we compare the studies, our results show a higher cure rate: 86% for our study vs. 79% in a study published by Wiegell *et al.* in 2008 (5) and 77% in a multicentre study published by Wiegell *et al.* in 2011 (6). This may be explained by the multiple sessions some of our patients underwent (in the other studies, all of the patients had only one session of D-PDT). Also, geographic conditions may, to some extent, play a role, as the level of effective red light at our latitude is above the threshold of 8 J/cm^2 suggested by Wiegell *et al.* (3).

Our study was carried out in São Paulo, Brazil, between August 2012 and May 2013, and even the patients treated during the winter had a good response. Therefore, in this preliminary pilot study, we conclude that D-PDT is an efficient and almost pain-free therapeutic option for thin AKs with no seasonal restrictions, at least in São Paulo.

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