

UVB Phototherapy for sclerosing skin conditions - series of 10 cases

Nada Bennouna, Fouzia Hali, Hayat Skali, Soumiya Chiheb

Department of Dermatology and Venerology, Ibn Rochd University Hospital Casablanca, Morocco

Corresponding author: Nada Bennouna, MD, E-mail: nadabennouna1@gmail.com

ABSTRACT

Background: Phototherapy is a branch of physical therapy that employs natural or artificial light in the treatment of dermatoses. It includes UVA irradiation, which is absorbed in the deep layers of the skin, and UVB penetrates into the epidermal layer and has a significant ability to cause erythema. **Materials and Methods:** This was a retrospective study of records of patients with Scleroderma-like disorders treated with narrow-spectrum phototherapy in the phototherapy unit from April 2021 to April 2022. **Results:** In our group, NB-UVB treatment had a favorable safety profile and was typically well tolerated by patients, side effects were limited to 2 cases of transitory erythema and one case of mild hyperpigmentation. **Conclusion:** To our knowledge, this was the first study of the overall efficacy of NB UVB in these indications. Additionally, longer-term studies are needed to investigate long-term results, safety, and effectiveness when combined with other treatments.

Key words: Phototherapy; UVA; UVB; Sclerosing; Skin

INTRODUCTION

The wavelengths of ultraviolet (UV) light range from 200 to 400 nm, it is divided into UVA (320–400 nm), UVB which include UVB-Broadband (290-320 nm) and UVB-Narrowband (NB-UVB) (311-313 nm), and UVC (200-290 nm) that are stopped by the ozone and not used for phototherapy [1].

Phototherapy is the therapeutic use of ultraviolet light, which the wavelengths and the doses of UV radiation may vary according to the indication [2].

UVB phototherapy is the therapeutic recourse to ultraviolet B with a narrow spectrum, their use has developed in recent years, particularly in the treatment Scleroderma-like disorders, thus showing good results.

The objective of the study was to evaluate the efficacy and tolerance of narrow-spectrum UVB rays

in improving the skin involvement of scleroderma syndromes.

MATERIALS AND METHODS

This was a retrospective study of records of patients with Scleroderma-like disorders treated with narrow-spectrum phototherapy in the phototherapy unit for a period of one year from April 2021 to April 2022.

Ten patients were included. UVB rays were delivered 3 times a week by a TL01 cabin (311-313 nm).

All the lesions were assessed before and after UVB therapy by the same dermatologists, and we defined 4 types of response: complete (disappearance of more than 90% of the lesions), partial (disappearance of at least 50% of the lesions), mediocre response (improvement between 20 and 50% of the lesions) and failure (reduction of less than 20% of lesions).

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In addition, we used the modified Rodnan skin score (MRSS) to measure the therapeutic effectiveness.

RESULTS

10 patients with a diagnosis of Scleroderma-like disorders were selected for phototherapy treatment. In terms of gender, 8 patients were female and 2 were male. 6 patients were of phototype 3 (82%) and 4 of phototype 4 (18%). In terms of age, the average age was 48.5 years with extremes of 37 and 76 years. The average evolution was 2.39 years with extremes ranging from 4 months to 5 years.

These patients were classified according to the diagnosis and the evolutionary stage, thus the pathologies treated were 3 cutaneous morphea, 1 Shulman's syndrome, 5 systemic sclerosis, and 1 case of scleromyxedema. A total of 21 sclerosis lesions were studied, and the distribution in relation to the evolutionary stage was 5 lesions at the inflammatory stage (20%) and 16 at the stable stage (80%).

The type of phototherapy was narrowband UVB. The protocol followed in the department was to start with 0.14 J/cm², and to increase by 0.05/session depending on the intensity of the phototoxic erythema with a number of sessions ranging from 15 to 30 and a dose cumulative between 20 and 30 J/cm². It should also be noted that 3 patients had been under treatment combined with corticosteroids and methotrexate.

The lesions were clinically evaluated after the treatment by clinical palpation carried out by the attending physician himself, looking for resistance to pinching or skin hardening. This skin pinching was performed before and after phototherapy and then judged on a scale ranging from zero (no sclerosis, normal pinching) to three (severe sclerosis, no pinching) as described by Rook et al, in 1992 [3].

In terms of analysis evaluation of the improvements, clinical palpation showed a softening of both inflammatory and stable lesions, with a decrease in the scores in post-treatments because we see that the sum of the pre-treatment scores was 54 points versus 20 points in post-processing. Thus, the difference between the initial and the final state was 34 points, with a decrease of 62.9%.

In our group, NB-UVB treatment had a favorable safety profile and was typically well tolerated

by patients, side effects were limited to 2 cases of transitory erythema and one case of mild hyperpigmentation.

DISCUSSION

Both phototherapy and solar UV radiation (heliotherapy) have long been utilized to treat various skin conditions [4]. In many skin conditions today, including psoriasis, atopic dermatitis, vitiligo, morphea, and mycosis fungoides phototherapy represents an interesting therapeutic approach [5]. According to reports, UVA-1 is effective in treating morphea by lowering the number of Langerhans and mast cells [6]. UVB phototherapy has recently been explored for the treatment of morphea with promising results in combination with acitretin [4] or antimalarials [5]. Additionally, all localized sclerosis lesions improved upon clinical examination following phototherapy, and clinical palpation showed softening of the lesions.

The use of UVB as a treatment method for sclerosing skin disorders has not been the subject of much research. The first study on the general effectiveness of NB UVB phototherapy in morphea was done by Kreuter et al. [7]. The authors consider that, despite being a viable choice, UVA1 or BB UVA is preferable to NB UVB in the treatment of sclerosing skin disorders due to their deeper penetration and the larger body of research supporting these modalities.

While UVA radiation affects blood vessels, dendritic cells, fibroblasts, mast cells, and granulocytes, UVB radiation only reaches the epidermis and upper dermis. By stimulating keratinocytes, circulating and cutaneous T lymphocytes, monocytes, Langerhans cells, mast cells, and fibroblasts, narrowband UVB has local and systemic immunosuppressive effects. Nuclear DNA is an endogenous chromophore that absorbs UVB radiation, causing DNA photoproducts to develop and ultimately limit DNA synthesis. The synthesis of prostaglandins and cytokines by UV radiation is another method for suppressing the immune system [8]. The beneficial effects seen in morphea may be partially or entirely explained by the immunomodulatory effects of UVB light.

Overall NB-UVB is a cost-effective therapy [9], with advantages such as reducing the need for topical therapies [10], safe use for pregnant women and well-tolerated treatment for children. For patients who require multiple sessions NB-UVB confers a

lower risk of non-melanotic skin malignancy, and different medications can be combined to reduce the cumulative dose, providing a faster clearance rate and longer disease-free intervals [11]. These include systemic agents such as systemic retinoids, methotrexate, cyclosporine, antioxidants [12], and topicals such as analogues of vitamin D, tacrolimus [13], retinoids, pimecrolimus [14].

CONCLUSION

Scleroderma-like disorders are improved by phototherapy through three major mechanisms, namely: the immunomodulation of inflammation, the stimulation of collagen synthesis and the apoptosis of T lymphocytes. Unlike broadband UVB, it has been demonstrated that UVB NB penetrates deep into the dermis, which prompted us to think about UVB NB phototherapy as a possible treatment for these kinds of skin disorders.

All patients responded favorably to the suggested therapy, and all treated lesions showed improvement, which was supported by a clinical evaluation. Our findings motivate us to carry on with our research, which also includes a control group, while continually improving the scientific methodology.

To our knowledge, this was the first study of the overall efficacy of NB UVB in these indications. Additionally, longer-term studies are needed to investigate long-term results, safety, and effectiveness when combined with other treatments.

Statement of Human and Animal Rights

All the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the 2008 revision of the Declaration of Helsinki of 1975.

Statement of Informed Consent

Informed consent for participation in this study was obtained from all patients.

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