

## Original Article

# Narrowband ultraviolet B radiation therapy for vitiligo in Asians

Faria Asad\*, Haroon Nabi\*\*, Muhammad Nadeem\*

\* Department of Dermatology, King Edward Medical College/Mayo Hospital, Lahore

\*\* Department of Dermatology, Lahore Medical College/Ghurki Trust Hospital, Lahore

**Abstract** *Background* Vitiligo is an acquired disorder of pigmentation with 1-2% incidence worldwide. Various treatment modalities have been described in literature with variable results. Recently, narrowband ultraviolet B (NBUVB) has been reported to be effective in vitiligo.

*Objective* To assess the efficacy of narrowband ultraviolet B therapy in Asian patients with localized vitiligo.

*Patients and methods* The study was open and uncontrolled. All patients with localized vitiligo who were seen at the Phototherapy Unit, of the Skin Clinic, Lahore from July, 2002 to June, 2003 and fulfilled the inclusion criteria, were treated with NBUVB as part of our clinical practice. The initial dose was 0.5 J/cm<sup>2</sup> independent of the skin type. The dose was increased by 20% at each treatment session.

*Results* A total of 23 patients were recruited; 13 females and 10 males. Their mean age was 27 years (range 9-48 years). 65% of patients showed >50% improvement. Certain anatomic sites responded better than the others. The best response i.e. >75% repigmentation was seen in lesions on face and neck. Lesions on the trunk also achieved more than 50% repigmentation. However, none had more than 10% repigmentation on hands and feet.

*Conclusion* Our results showed that NBUVB is a safe and effective option for improving cosmetic appearance in vitiligo patients. Its adverse effects were minimal and transient and were well tolerated by the patients.

**Key words**

Vitiligo, narrowband UVB, repigmentation

**Introduction**

Vitiligo is an acquired disorder of pigmentation with 1-2% incidence worldwide.<sup>1</sup> The clinical presentation is characterized by solitary or multiple depigmented macules or patches that may

arise in localized, segmental or generalized distribution.<sup>2</sup> Various treatment modalities have been described in literature with variable results. Non-surgical therapies, considered as the first line treatment include steroids (topical/oral), oral and topical psoralens with ultraviolet A (PUVA) and recently, narrowband ultraviolet B (UVB) have been reported to be effective in vitiligo. PUVA treatment is well documented in vitiligo but its use is limited by its acute and chronic side effects.<sup>3</sup>

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**Address for correspondence**

Dr. Faria Asad,  
Department of Dermatology, Unit II,  
KEMC/Mayo Hospital, Lahore, Pakistan  
Ph # 042 5726057

Narrowband ultraviolet B (NBUVB) was introduced as an effective treatment for vitiligo by Westerhof *et al.*<sup>4</sup> in 1997. NBUVB may be less carcinogenic and oral medication is not needed. However, only few clinical trials have been conducted in Asian skin. We describe our experience with narrowband UVB phototherapy as further evidence of its utility in the treatment of vitiligo in Asian skin type.

### Patients and methods

The study was open and uncontrolled. All patients with vitiligo who were seen at the Phototherapy Unit of the Skin Clinic, Lahore from July, 2002 to June, 2003 and fulfilled the inclusion criteria, were treated with NBUVB as part of our clinical practice.

The inclusion criteria were, vitiligo resistant to or the patient not willing to use the available treatment modalities because of their side effects.

All the patients were treated with NBUVB as a monotherapy in a phototherapy unit with a bank of 12 fluorescent tubes (TL 01 Phillips), with peak emission of 311 to 312 nm and internal dosimeter. Therapy was administered 3 times a week on non-consecutive days. Affected parts of the body were exposed during each treatment. During treatment, the eyes were protected by UV-blocking goggles. The initial dose was 0.5 J/cm<sup>2</sup> independent of the skin type. The dose was increased by 20% at each treatment session. If the patients reported mild erythema or pruritus, the irradiation dose was held constant for the subsequent treatments, and until resolution of symptoms. If there was a complaint of

symptomatic erythema (burning, pain), the next treatment was omitted and the dose was decreased by 20%. Once 75% repigmentation was achieved, the treatment was tapered to twice per week. Lesional photography was done at the pretreatment visit and then monthly thereafter.

In a patient who did not show an improvement up to 25% after 30 exposures, the treatment was stopped. The response to narrowband UVB therapy was expressed as follows:

- < 25% response (grade D)
- 25-50% response (grade C)
- 50-75 response (grade B)
- > 75% response (grade A)

### Results

A total of 23 patients were recruited; 13 (56.5%) females and 10 (43.5%) males. Their mean age was 27 years (range 9-48 years). All of them belonged to Fitzpatrick skin type IV and V. Twenty per cent patients had a positive family history, and the mean duration of disease ranged from 5 months to 10 years.

Four patients did not complete the study because of various reasons. None of these patients experienced any adverse effects from phototherapy that warranted discontinuation of treatment.

Treatment characteristics in different groups are presented in the **Table 1**. Nine out of 19 cases responded well and were placed in grade A (**Figure 1-4**), 3 were accorded grade B, 4 patients showed an appreciable response (grade C) while three patients had

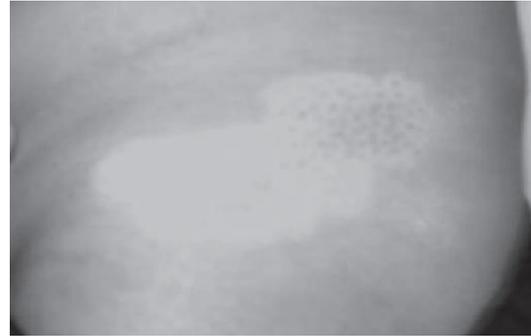
**Table 1** Response to narrowband UVB therapy in relation to phototherapy data

	<i>Grade A (n=9)</i>	<i>Grade B (n=3)</i>	<i>Grade C (n=4)</i>	<i>Grade D (n=3)</i>
No. of treatments (mean)	98	104	82	28
Cumulative UVB dose in J/cm <sup>2</sup> (mean)	88	108	96	49

**Figure 1** Vitiligo involving periorbital region.**Figure 2** Grade A (> 75%) improvement at the end of therapy.

a significant repigmentation (grade D).

Certain anatomic sites responded better than the others. The best response i.e. >75% repigmentation was seen with lesions on face and neck. Lesions on the trunk also achieved more than 50% repigmentation. However, none had more than 10%

**Figure 3** A patch of vitiligo involving the trunk.**Figure 4** Grade A (>75%) improvement at the end of therapy. Perifollicular pattern of repigmentation is prominent.

repigmentation on hands and feet.

Repigmentation was generally follicular in nature (**Figure 4**) and it was darker than the surrounding non-lesional skin. However, in all cases color intensity normalized over several weeks.

The number of treatments ranged from 30-200 and the mean dose of treatment was  $89 \pm 23$  J/cm<sup>2</sup>. The duration of treatment ranged from 3 months to 14 months. No significant relationship was found between the four repigmentation grades and the

variables of age, sex, skin type, positive family history and duration of disease.

Adverse effects were mild and transient. Nine patients reported erythema while 4 patients reported pruritus, which resolved spontaneously. Only 1 patient complained of severe erythema and burning of the lesional as well as non-lesional skin. The treatment was temporarily stopped until resolution of symptoms and started again with a lower dose.

### Discussion

In 1997, Westerhof *et al.*<sup>4</sup> showed that NBUVB was more effective than PUVA in vitiligo and that 67% of his patients in NBUVB group showed repigmentation.<sup>5</sup> He irradiated his patients twice a week and the initial dosage was 75 mJ/cm<sup>2</sup> with 20% increments until erythema developed. Later, a report from the United States<sup>6</sup> showed that by using a higher initial dosage i.e. 280 mJ/cm<sup>2</sup> and doing the procedure thrice a week, the results are better. In that study, response was good in patients with a shorter duration of disease and skin types II and III.<sup>6</sup>

Based on all previous studies,<sup>4,6</sup> the factors associated with good response were high initial dosage, more frequent exposures, darker skin types and shorter duration of disease. Our experience did not show any significant difference between skin types of either responders or non-responders because majority of the patients were of skin type IV. Our lower efficacy (44%) may be because of patient selection. The resistant forms of vitiligo like the acral and lip tip cases were also included in our study. Our results showed that NBUVB is a safe and

effective option for improving cosmetic appearance in vitiligo patients. Its adverse effects were minimal and transient and were well tolerated by the patients. The general advantages of NBUVB over PUVA are absence of nausea or vomiting, less chances of unpredictable phototoxic reactions, less color contrast formation between lesional and pigmented skin, shorter duration of treatment and economy.<sup>7</sup> Likewise, systemic steroids have their own limitations and topical steroids can only be used when there is limited area involvement.<sup>8</sup>

The mechanism of action of narrowband phototherapy in vitiligo has not been completely understood. Vitiligo is characterized by the selective destruction of melanocytes; the cause is unknown, but is generally believed to be an autoimmune process. Repigmentation, when it occurs, begins at the hair follicle, where dopa-negative, amelanotic melanocytes in the outer root sheaths are somehow activated to proliferate, produce melanin and migrate outwards to the surrounding depigmented skin. Melanocyte mitogenesis, melanogenesis and melanocyte migration have been shown to be induced by various cytokines and inflammatory mediators including interleukin II. Interleukin I stimulates the synthesis of endothelin-I, a potent vasoconstrictor peptide that has mitogenic and melanogenic properties.<sup>9</sup> Imokawa, Miyagishi and Yada<sup>9</sup> found that the expression of endothelin-I, II-I and tyrosinase in human keratinocytes, *in vitro* and *in vivo*, were increased after UVB irradiation, suggesting a possible mechanism of UVB-induced repigmentation.

In summary, our findings support previous observations that NBUVB is a useful and well tolerated treatment option for patients with vitiligo. However, long term follow up is needed to comment on its safety in view of the carcinogenic potential.

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