Treatment of vitiligo
Njoo, M.D.

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Treatment of generalized vitiligo in children with narrowband (TL-01) UV-B radiation therapy

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Narrowband UV-B therapy in children

ABSTRACT

Background: Only a few clinical trials have been performed on the treatment of children with generalized vitiligo. Recently, narrowband UV-B therapy has been reported to be an effective and safe therapeutic modality in adult patients with vitiligo.

Objective: We studied the effectiveness and safety of narrowband UV-B therapy in children with generalized vitiligo and evaluated the effect of the therapy on the quality of life in these children.

Methods: In an open trial, 51 children (20 males, 31 females) with generalized vitiligo were treated twice weekly with narrowband UV-B radiation therapy for the maximum period of 1 year. The Children's Dermatology Life Quality Index (CDLQI) was used to evaluate the psychosocial impact of disease and treatment and was scored before and after therapy.

Results: The treatment resulted in more than 75% overall repigmentation in 53% of the patients and in stabilization of the disease in 80%. Responsiveness to therapy was positively correlated with localization of the lesions and the patients' compliance. Adverse events were limited and transient. The better the repigmentation grade, the better the CDLQI scores had improved.

Conclusion: Narrowband UV-B therapy is effective and safe in childhood vitiligo; it also may significantly improve the quality of life.
INTRODUCTION

Vitiligo, a common idiopathic acquired depigmentation disorder occurs mostly among young people\(^1\). A Dutch study performed among 1061 patients with vitiligo showed that 25% of the patients noted the onset of vitiligo before the age of 10 years, 50% before the age of 20, and 95% before the age of 40\(^2\). Of the total population of patients with vitiligo, between 23%\(^3\) and 26%\(^4\) have been reported to be children younger than 12 years. Studies have also shown that the psychosocial impact of the disorder in children should not be underestimated\(^5\-7\). Vitiligo beginning at childhood can be associated with significant psychological trauma that may have lasting effects on the person’s self-esteem\(^5\).

Only a few clinical trials have been performed on the treatment of children with generalized vitiligo. Recently, narrowband UV-B therapy has been reported to be an effective and safe therapeutic modality in adult patients with vitiligo\(^8\). Encouraged by this study, we have conducted an open trial to study the effectiveness and safety of narrowband UV-B therapy in children with generalized vitiligo. In addition, we have evaluated the effect of the therapy on the quality of life of these children by means of a disease-specific questionnaire.

PATIENTS AND METHODS

STUDY DESIGN

The study was open and uncontrolled. Subjects were screened at a preliminary visit, about 1 or 2 weeks before starting treatment. Reviews were performed after 3, 6, 9 and 12 months of treatment.

PATIENTS

Children between 4 and 16 years old with vitiligo vulgaris, with a minimal extent of depigmentation of 5% of the body surface and who did not receive any local or systemic immunosuppressive treatment for the vitiligo in the past 6 months were included. Patients with a history of previous adverse effects and/or phototoxic reactions related to photo(chemo) therapy, a history of photosensitivity or photomediated disorders, skin type I (according to Fitzpatrick classification I-VI)\(^9\), concomitant radiotherapy, chemotherapy or immunosuppressive therapy and claustrophobia were excluded.
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Informed written consent was obtained from the parents. In each case, the nature of treatment was explained, including details of the possible benefits and adverse effects. All patients and parents received a phototherapy information sheet.

The trial was approved by the Medical Ethical Committee of the Academic Medical Center, Amsterdam, The Netherlands.

NARROWBAND UV-B THERAPY

Twenty-six narrowband fluorescent tubes (Philips TL 100W/01) with a spectrum of 310 to 315 nm and a maximum wavelength of 311 nm were installed in a Waldmann UV-1000 cabinet (Erbe Nederland, Nieuwegein, The Netherlands). The radiance in the UV-B cabinets was checked routinely with a UV-B detector (Waldmann AG, Schwenningen, Germany). The mean radiance was 10.0 mW/cm².

Narrowband UV-B therapy was given twice weekly, not taking place on 2 consecutive days. The initial dose was 0.25 J/cm², independent of the skin type. The dose was increased by 20% each treatment. The optimal constant dose was achieved when minimal erythema occurred in the lesions. During the treatments the eyes were protected by UV blocking goggles. If significant depigmentation was present in the eyelids and parents or patients insisted on treating these areas, patients were told to keep their eyes shut during the treatments. All patients kept their underwear on to shield the genitals from narrowband UV-B exposure.

Children were advised to protect their skin against excessive exposure to natural sunlight especially between 11 AM and 3 PM during sunny days on both treatment as well as nontreatment days. In addition, all patients were instructed to apply a sunscreen with a high protection factor (SPF 25 or higher) on sun-exposed areas.

EVALUATION OF TREATMENT EFFECTS

Total body photography was taken of each patient, involving photographs of the front and back of patients in a standard pose. In addition, close-up photographs were taken from lesions that most bothered the patient or parents (e.g. those located on the face or neck). Photographs were taken before and after termination (after 12 months) of the therapy. The response to narrowband UV-B therapy was expressed as “less than 25%” (group A), “between 26% and 75%” (group B) and “more than 75%” (group C) repigmentation. Both “overall” repigmentation grade as well as repigmentation grade related to localization of the lesions were estimated by 2 independent observers by comparing photographs.
The disease activity by history was scored by means of the “vitiligo disease activity (VIDA) score” before and after 12 months of therapy, as described elsewhere. This is a scoring system of the patient’s own opinion of the present disease activity within the time periods indicated as follows; active in the past 6 weeks (score +4); active in the past 3 months (score +3); active in the past 6 months (score +2); active in the past year (score +1); stable for at least 1 year (score 0) and stable for at least 1 year with spontaneous repigmentation (score -1). The term “active” is defined as the expansion of existing lesions and/or the appearance of new lesions. “Stable” refers to the condition when these symptoms are not present.

The phototherapy notes were reviewed for information regarding the duration of treatment, total number of treatments, cumulative narrowband UV-B dose, and adverse effects.

PATIENT COMPLIANCE

Patient compliance was noted in terms of attendance frequency for treatment. If treatment was attended regularly, i.e., twice weekly, each patient received 100 treatments over the period of 1 year. Patient compliance was therefore scored as follows: score 1, less than 25 treatments; score 2, between 25 and 50 treatments; score 3, between 50 and 75 treatments; score 4, more than 75 treatments.

CHILDREN’S QUALITY OF LIFE QUESTIONNAIRE

A Dutch version of the “Children's Dermatology Life Quality Index (CDLQI)” was used to study the psychosocial load of disease and treatment. Formal permission to use the CDLQI was given by Dr A.Y. Finlay from the University of Wales College of Medicine, Cardiff, United Kingdom. The initial version was validated by two back translations performed by two independent translators. The final Dutch version was made using the back translations and adjustments proposed by Dr Finlay.

The CDLQI involves 10 questions regarding the patient’s own perceptions of the effects of the disease on daily life. Each question was evaluated with a 4-point scale: 0 indicates not at all; 1, a little; 2, a lot; 3, very much. All children were asked to complete the CDLQI, before and after termination of therapy, and if possible, without the help of their parents.
STATISTICAL ANALYSIS

Statistical analysis was performed by means of the Chi-square test, the 2-tailed Student t test paired or unpaired or the Wilcoxon matched pairs rank sum test, depending on the type of the data set involved\textsuperscript{13}. Significance level was set at $p < 0.05$. Where applicable, 95% confidence intervals (95% CI) were calculated for proportions with the software program “Confidence Interval Analysis” for MS-DOS by means of the exact method (version 1.0, 1989, M.J. Gardner and D.G. Altman, British Medical Journal, London)\textsuperscript{14}.

RESULTS

Patient data

A total of 51 patients were recruited; there were 31 girls and 20 boys. The mean age was 9.9 years. There were approximately as many light-skinned children (n=26) (i.e., skin types II and III) as dark-skinned ones (n=25) (i.e., skin types IV and V). Ten patients (20%) had a positive family history. The mean duration of disease was 4.0 years and the mean percentage of depigmentation was 15.9%. Four patients (8%) reported that they have experienced “spontaneous repigmentation” in the past. However, at the time of history taking, all 4 reported that the disease was in an active stage. Twenty patients had been treated previously without any results. Most patients (33% [17/51]) were treated before with topical corticosteroids. All 20 patients had stopped therapy at least 6 months before entering the study.

Effect of narrowband UV-B therapy on repigmentation and disease activity

In most patients (82% [42/51]), more than 25% overall repigmentation was observed (Figure 1). More than 75% overall repigmentation was seen in 27 patients (53%) (Figures 2 and 3). Of these, only 3 (6%) showed complete repigmentation; 2 females, 7 and 15 years old respectively, both with 5% depigmentation and 1 male patient, 9 years old with 8% depigmentation.

Certain anatomic sites had responded better than others (Table 1). The best response (i.e., more than 75% repigmentation) was achieved with lesions located on the face (72% of the lesions) and the neck (74% of the lesions). Lesions located on the breast, abdomen, back, arms and legs responded with more than 75% repigmentation in 41%, 45%, 44%, 33% and 36% of the cases, respectively. The joints such as knees and elbows seldom
CHAPTER 3.6

Figure 1. Estimated overall percentage of repigmentation after narrowband UVB (TL-01) therapy in 51 children with vitiligo vulgaris

Figure 2. Excellent repigmentation of the face and neck of a six year old Hindustani girl. Left, before therapy and Right, after therapy

showed more than 75% repigmentation. Most lesions on the hands and digits (78% of the cases) and on the feet and toes (77% of the cases) only showed minor or no repigmentation.

The disease activity, as represented by the VIDA scores, was significantly decreased
after narrowband UV-B therapy ($p < 0.001$) (Table 2). Before therapy, most patients (96% [49/51]) had active disease (score of +1 and higher), while after therapy the disease had stabilized (score of 0) in 80% (41/51) of the cases. There were no significant differences in the changes of the VIDA scores and the 3 repigmentation grades (<25%, 26-75% and >75% repigmentation; results not shown).

**Response to narrowband UV-B therapy in relation to clinical data.**

There were no significant associations found between the 3 repigmentation grades (<25%, 26-75% and >75% repigmentation) and the variables sex, age, skin types, positive family history, duration of disease, VIDA scores and percentage of depigmentation (results not shown).

**Table 1. Response to narrowband UV-B therapy in relation to the localization of the lesions * **

<table>
<thead>
<tr>
<th>Localization of the lesions</th>
<th>Repigmentation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 25%</td>
</tr>
<tr>
<td>Face $n=39$</td>
<td>4 (10)</td>
</tr>
<tr>
<td>Neck $n=19$</td>
<td>1 (5)</td>
</tr>
<tr>
<td>Breast $n=29$</td>
<td>6 (21)</td>
</tr>
<tr>
<td>Abdomen $n=22$</td>
<td>5 (23)</td>
</tr>
<tr>
<td>Back $n=16$</td>
<td>4 (25)</td>
</tr>
<tr>
<td>Arms $n=33$</td>
<td>8 (24)</td>
</tr>
<tr>
<td>Hands $n=18$</td>
<td>14 (78)</td>
</tr>
<tr>
<td>Legs $n=44$</td>
<td>12 (27)</td>
</tr>
<tr>
<td>Feet $n=22$</td>
<td>17 (77)</td>
</tr>
</tbody>
</table>

*Data are presented as numbers and percentages (between brackets).*
Table 2. VIDA scores before and after narrowband UV-B therapy

<table>
<thead>
<tr>
<th>VIDA score</th>
<th>Before therapy (No. of patients)</th>
<th>After therapy (No. of patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>41</td>
</tr>
<tr>
<td>+1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>+2</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>+3</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>+4</td>
<td>8</td>
<td>0</td>
</tr>
</tbody>
</table>

p value VIDA score before and after therapy' $p < 0.001$

'Wilcoxon matched pairs test (for ordinal data)

not shown).

Three of the 4 patients (75%) with spontaneous repigmentation in history showed more than 75% repigmentation, 1 showed 50% repigmentation. Of the 19 patients with previous treatment failures by history, there were 2 (11%) showing less than 25% repigmentation, 4 (21%) with repigmentation between 26% and 75%, and 13 (68%) with more than 75% repigmentation.

**Response to narrowband UV-B therapy in relation to phototherapy data**

Of the 51 patients, 38 (75%) received narrowband UV-B therapy for the period of one year. One patient decided to stop the therapy after 3 months because of the travel time and costs, and one stopped after 4 months because no response was seen. The remaining 11 patients terminated therapy sooner than 12 months because “satisfying repigmentation was achieved” (6 patients) and because of the summer holidays (5 patients). Table 3 shows that in group A duration of treatment was significant lower than that in group C ($p < 0.05$). Also, the number of treatments and the cumulative UV-B dose was significant lower for group A than group B ($p < 0.05$) and for group A than for group C ($p < 0.05$). The compliance scores were significant lower in group A than in group C ($p < 0.05$). For the whole group, the mean ± SD cumulative dose was $91.3 ± 46.6$ J/cm².

**Adverse effects**

Itching was reported in 4 (8%) and xerosis cutis in 2 patients (4%). These complaints disappeared after application of an emollient (Lutsine Xeramance, a product of Iduna Healthcare, Hendrik Ido Ambacht). Skin burns were not observed.
## Narrowband UV-B therapy in children

### Table 3. Response to narrowband UV-B therapy in relation to phototherapy data

<table>
<thead>
<tr>
<th>Group</th>
<th>Overall percentage of repigmentation *</th>
<th>A (n=9)</th>
<th>B (n=15)</th>
<th>C (n=27)</th>
<th>Whole group (n=51)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Duration of treatment, mean ± SD, months</td>
<td>9.1 ± 3.5 ‡</td>
<td>10.9 ± 1.7</td>
<td>11.9 ± 0.5</td>
<td>11.1 ± 2.0</td>
</tr>
<tr>
<td></td>
<td>No. of treatments, mean ± SD</td>
<td>56.4 ± 22.7 ††</td>
<td>76.3 ± 16.7</td>
<td>86.7 ± 14.5</td>
<td>78.3 ± 19.9</td>
</tr>
<tr>
<td></td>
<td>Compliance score (No. of patients)</td>
<td>§</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>2</td>
<td>8</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Cumulative UV-B dose, mean ± SD, J/cm²</td>
<td>41.5 ± 22.4 ††</td>
<td>101.4 ± 52.9</td>
<td>102.3 ± 38.3</td>
<td>91.3 ± 46.6</td>
</tr>
</tbody>
</table>

SD indicates standard deviation; J/cm²; Joules per square centimeters

*Overall percentage of repigmentation: A indicates less than 25% repigmentation; B, between 26% and 75% repigmentation; C, more than 75% repigmentation

† A vs B: t test, p < 0.05

‡ A vs C: t test, p < 0.05

§ A vs C: Chi-square test for 4X2 contingency table, p < 0.05

### Table 4. Response to narrowband UV-B therapy in relation to CDLQI score

<table>
<thead>
<tr>
<th>Group</th>
<th>Overall percentage of repigmentation *</th>
<th>A (n=9)</th>
<th>B (n=15)</th>
<th>C (n=27)</th>
<th>Whole Group (n=51)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CDLQI before therapy, mean ± SD</td>
<td>4.6 ± 4.2</td>
<td>6.3 ± 4.8</td>
<td>5.6 ± 3.2</td>
<td>5.6 ± 3.8</td>
</tr>
<tr>
<td></td>
<td>CDLQI after therapy, mean ± SD</td>
<td>3.0 ± 2.5</td>
<td>3.3 ± 2.3</td>
<td>1.1 ± 0.9</td>
<td>2.1 ± 2.0</td>
</tr>
<tr>
<td></td>
<td>p value CDLQI score before and after therapy †</td>
<td>0.09</td>
<td>0.002</td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

CDLQI, Children’s Dermatology Life Quality Index (maximum score=30); SD, standard deviation.

* Overall percentage of repigmentation: A, less than 25% repigmentation; B, between 26% and 75% repigmentation; C, more than 75% repigmentation; † Paired Student t test
Quality of life

All patients completed the CDLQI forms, without any difficulties. The mean CDLQI scores before and after therapy for each response group are presented in Table 4. In the patient group with the lowest overall percentage of repigmentation (group A), the CDLQI scores were not significantly decreased after therapy (p = 0.09). However, in both groups B and C, the difference of the CDLQI scores before and after therapy was significant; the better the repigmentation grade, the more significant was the decrease in the CDLQI scores (group B: p = 0.002; group C: p < 0.001).

DISCUSSION

Several modalities have been applied to treat children with generalized vitiligo. Oral trioxsalen plus sunlight showed variable results in a few independent studies\textsuperscript{15-17}. Psoralens must be used with caution because of their phototoxic properties. Other known adverse effects are nausea, pruritus and increased contrast between lesional and normal pigmented skin\textsuperscript{1}. In general, oral psoralen plus UV-A (or "PUVA") is not recommended for children under 12 years\textsuperscript{18,19}. It is known that repigmentation by PUVA is a long and tedious process, that can take months to years of therapy. There is concern over the long term especially in children, regarding the increased risks for both carcinogenesis and premature aging of the skin. Moreover, dermatologists are reluctant to prescribe phototherapy in (young) children for any skin disorder because of the practical difficulties encountered in this age group\textsuperscript{20,21}. L-phenylalanine plus UV-A has also been reported to have good results in children with extensive vitiligo\textsuperscript{22}, but these results have not been confirmed thus far. The administration of systemic corticosteroids in children was reported to have alleviated the vitiligo in some children, but the risk of suppression of the adrenal cortex should not be underestimated\textsuperscript{23}. Topical corticosteroids or topical PUVA(SOL)\textsuperscript{24-26} are sometimes used, with variable results, to treat limited areas in patients with extensive vitiligo. However, there is still no effective and safe therapy available to treat patients who are not responding to these therapies satisfactorily. Our results indicate that narrowband UV-B therapy can represent a valuable and safe treatment modality for vitiligo in children, by improving both the cosmetic appearance and the psychosocial functioning of these children.

Narrowband UV-B therapy seems to produce similar results in adults as well as in children. The percentage of patients who achieved more than 75% repigmentation in
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this study (53%; 95% CI, 39% to 67%) corresponds well with that of a previous study involving mostly adult patients (63%; 95% CI, 48% to 76%)

As with topical PUVA therapy, which is also applied for childhood vitiligo, narrowband UV-B therapy has no systemic effects such as nausea or vomiting and does not require post-treatment eye protection. However, general advantages of narrowband UV-B therapy over topical PUVA therapy include less unpredictable phototoxic reactions, absence of perilesional hyperpigmentation, less contrast formation between lesional and pigmented skin, shorter treatment sessions and absent drug costs.

Although the study was open and uncontrolled, most of the observed repigmentation can be attributed to the effect of narrowband UV-B therapy rather than to that of spontaneous repigmentation. Spontaneous repigmentation only rarely occurs in vitiligo, especially in generalized vitiligo. Indeed, in our study, only 4 patients (8%) reported that they have observed spontaneous repigmentation before. When spontaneous repigmentation occurs in generalized vitiligo, it is usually only partial whereas its extent has never been reported to be of clinical significance, i.e., more than 75% or even 100% of the initial extent of the lesions. Furthermore, patients (and their parents) were repeatedly instructed to protect the skin against extra sun rays and to apply a sun-blocking agent. Finally, most of the patients, who did not respond to previous treatments, showed excellent repigmentation after narrowband UV-B therapy. Despite these arguments, we still advocate the performance of a (multicenter) randomized, controlled trial in the future to substantiate our findings. Properly designed follow-up studies should investigate the permanence of the UV-B-induced repigmentations.

Some areas responded better than others. The face and neck showed the best results whereas the trunk and proximal extremities had moderate repigmentation. In contrast, acral sites (fingers, feet) and areas of bony prominence and lower hair growth density (wrists, ankles, and joints) hardly repigmented. These findings are in agreement with previous studies in vitiligo using narrowband UV-B, broadband UV-B or oral PUVA therapy. The mechanism of UV-induced repigmentation in vitiligo is unknown. It is proposed that the effects of PUVA therapy in vitiligo can be explained by a two-step process, both steps of which may occur simultaneously: first, the stabilization of the depigmenting process and second, the stimulation of residual follicular melanocytes. Because in patients with active vitiligo, local and systemic abnormalities of the cellular and the humoral immunity are found, we may speculate that stabilization could be the
result of the well-known immunomodulating effects of UV-radiation\textsuperscript{30}. It is also likely that narrowband UV-B, similar to PUVA therapy, stimulates the melanocyte reserves in the hair sheaths, because repigmentation also occurred in a perifollicular pattern and was not observed in lesions with white amelanotic hairs. Further investigations should be conducted to elucidate these mechanisms and to support these hypotheses.

There was a significant relationship between patient compliance and the response to therapy, which was also earlier demonstrated with the use of oral PUVA\textsuperscript{32}. However, a high compliance involves a higher number of treatments resulting in a higher cumulative UV-B dose. Dermatologists may be reluctant to advise either oral PUVA or narrowband UV-B therapy in children because of the long-term risk of skin cancer. The increased risks for cutaneous malignancies associated with cumulative PUVA doses of higher than 1000 J/cm\textsuperscript{2} are well documented in patients with psoriasis\textsuperscript{33,34}. In mouse experiments, narrowband UV-B has also been shown to have a carcinogenic potential\textsuperscript{35}. Unfortunately, there is presently insufficient human epidemiological data available to provide recommendations regarding a "safe" maximum narrowband UV-B dose. According to a dose-response model it has been calculated that long-term narrowband UV-B therapy may carry less risk for skin cancer than PUVA therapy\textsuperscript{36}. Clinically, there are other reasons to assume that the risk for carcinogenesis in vitiligo may be lower compared with that in patients with psoriasis receiving narrowband UV-B therapy. Because of the absence of pigment, patients with vitiligo receive lower UV-B doses per treatment and do not expose themselves to extra sun rays. They also do not use immunosuppressive antipsoriatic drugs, such as cyclosporine, or cytostatic drugs such as methotrexate. In addition, the risk for cancer induction by UV-B therapy, can be minimized by applying the "skin saving principle"; parts of the body where no lesions are present (especially the face) should be shielded during treatments. Also parts that have repigmented satisfactorily should, if possible, be shielded during subsequent treatments (e.g., by wearing trousers). Genitals should also be shielded, because genital tumors have been observed after PUVA therapy\textsuperscript{37} and because these areas as a rule, do not respond to photo(chemo)therapy\textsuperscript{38}. Other precautions include the prevention of unnecessary exposure to natural sunlight on both treatment and nontreatment days and the use of UV-blocking agents on sun-exposed areas. In our experience, most children are able to understand these treatment precautions without any difficulties. In addition, we suggest that narrowband UV-B therapy should not be applied for longer than 12 months in children. If no response is observed after 6 months, further therapy should be discouraged. If, in responding cases, parents
or patients insist on continuing treatment after 1 year, only limited areas should be exposed to narrowband UV-B radiation.

The results of the CDLQI scores indicate that the impact of vitiligo on the quality of life is comparable with that of other chronic skin diseases at childhood, as shown in Table 5. After treatment, the CDLQI scores had improved significantly. Similarly, a previous study also reported the improvement of the CDLQI scores, after treatment for acne, atopic dermatitis, and psoriasis. Therefore, the data of this study provide further validation of the use of the CDLQI for clinical trials. Even in cases, where only moderate repigmentation was observed, patients and parents were satisfied, because the extent and visibility of the depigmentations were reduced. This may explain the psychological benefits of the treatment. Based on our findings, we believe that the clinical approach towards the child with vitiligo should not be any different from that of a child with another chronic skin disease; vitiligo should not be considered as merely a cosmetic and an untreatable disorder. Any child with vitiligo should be evaluated for their perceptions regarding the cosmetic disfigurement and for the impact the vitiligo has on their interaction with other children. Parents should be questioned regarding their concern about the nature and prognosis of the disease and the impact of the disease on their child's personal development. Children and parents should not be sent home, without being informed of all the available treatment options and their expected response and side effect-profiles. In this regard, we can recommend narrowband UV-therapy as first-

Table 5. CDLQI score in children with vitiligo compared with CDLQI scores in children with other skin conditions

<table>
<thead>
<tr>
<th>Skin condition</th>
<th>Score, mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy control group (n=47)</td>
<td>0.4 ± 0.7</td>
</tr>
<tr>
<td>Vitiligo (n=51) †</td>
<td>5.6 ± 3.8</td>
</tr>
<tr>
<td>Atopic eczema (n=47)</td>
<td>7.7 ± 5.6</td>
</tr>
<tr>
<td>Psoriasis (n=25)</td>
<td>5.4 ± 5.0</td>
</tr>
<tr>
<td>Acne (n=40)</td>
<td>5.7 ± 4.4</td>
</tr>
<tr>
<td>Moles and nevi (n=29)</td>
<td>2.3 ± 2.9</td>
</tr>
<tr>
<td>Scabies (n=6)</td>
<td>9.5 ± 10.5</td>
</tr>
</tbody>
</table>

* n = No. of subjects studied
Data are taken from Lewis-Jones MS, Finlay AY. The children's dermatology life quality index (CDLQI): initial validation and practical use (Br J Dermatol 1995: 132: 942-949.) except for †, this study.
choice therapy for children having generalized vitiligo, especially for those cases with associated psychosocial problems.

ACKNOWLEDGEMENTS

We thank Dr A.Y. Finlay, dermatologist, for his permission to use the Children’s Quality of Life Questionnaire (CDLQI, copyright 1993), Dr W. van der Schaar, clinical psychologist, for his advice regarding the CDLQI, and Dr L. Nieuweboer-Krobotova, resident, for her help in evaluating the photographs.

REFERENCES