

## Study the efficacy of Microneedling and Narrow Band Ultraviolet B Phototherapy in Vitiligo Treatment

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**Received:** 26 December 2022

**Accepted:** 8 February 2023

### Abstract

**Background:** Vitiligo is an acquired chronic idiopathic disorder characterized by progressive, patchy loss of pigmentation from the skin, overlying hair, and sometimes oral mucosa. The depigmented patches result from loss of melanocytes from the involved areas, apparently on an autoimmune basis. The resulting pigmentary disfigurement can be quite traumatic, especially when it involves the face, hands, and genitals. **Objectives:** The aim of this study was to assess the efficacy of microneedling and narrow band ultraviolet B phototherapy for treatment of vitiligo patients. **Methods:** This was a prospective study including 15 patients with bilateral nearly symmetrical non segmental vitiligo. Evaluation of the treatment was done by photography, clinical examination to assess the disease severity using Vitiligo Extent Tensity Index (VETI) score, and evaluation of re-pigmentation. **Results:** The VETI score ranged from 19 – 48 with a mean value of ( $\pm$ SD)  $34.47 \pm 9.43$  at baseline, ranged from 10 – 40 with a mean value of ( $\pm$ SD)  $27.47 \pm 9.69$  at 3 months and ranged from 9 – 40 with a mean value of ( $\pm$ SD)  $26.73 \pm 9.76$  at 6 months. VETI score was significantly lower at 3 months, 6 months compared to baseline and at 6 months compared to 3 months ( $p < 0.001$ ). **Conclusions:** Skin microneedling in combination with NB-UVB phototherapy is a safe and effective treatment option for stable localized vitiligo.

**Key words:** Vitiligo; Microneedling; NB-UVB phototherapy.

## **Introduction**

Vitiligo is an acquired chronic idiopathic disorder characterized by progressive, patchy loss of pigmentation from the skin, overlying hair, and sometimes oral mucosa. The depigmented patches result from loss of melanocytes from the involved areas, apparently on an autoimmune basis. The resulting pigmentary disfigurement can be quite traumatic, especially when it involves the face, hands, and genitals (1).

Theories regarding its pathogenesis include genetic, neural, cytotoxic, viral, autoimmune and oxidant-antioxidant theories. There is no treatment ensuring complete cure of vitiligo and therefore, there is a plethora of modalities, such as topical corticosteroid, vitamin D3 analogue derivatives, calcineurin inhibitors, photochemotherapy and excimer laser (2).

Microneedling improves drug penetration through stratum corneum which might potentiate their activity in addition it induce processes similar to wound healing with production of cytokines and growth factor beneficial for repigmentation (3).

The aim of this study was to assess the efficacy of microneedling and narrow

band ultraviolet B phototherapy for treatment of vitiligo patients.

## **Patients and methods**

This was a prospective study which included 15 patients with bilateral nearly symmetrical non segmental vitiligo. They were selected from the Outpatient Clinic of Dermatology, Andrology and Venereology Department in Benha University Hospital from January 2022 to July 2022. The inclusion criteria were patients with stable vitiligo and patients with vitiligo who stopped receiving any treatment (systemic, topical, or phototherapy) for the last 3 months before the study. The exclusion criteria were patients with active vitiligo, patients who have any other dermatological diseases, patients suffering from acute and chronic diseases (kidney and liver disease, ischemic heart disease or oncological diseases), or patients with bleeding or coagulation disorders or on anticoagulant medications and pregnant or lactating females.

### **Study period:**

The current study started from January 2022 to July 2022.

The study was approved by the ethics committee (ms 14\_10\_2021) of faculty of medicine Benha University.

There were adequate provisions to maintain the privacy of participants and confidentiality of the data. All patients were subjected to complete history taking including onset, course and duration of the disease, previous treatments, history of drug intake, family history of the disease and past history of other skin or systemic disease, general (weight, height, BMI). and dermatological examination to exclude any systemic or dermatological diseases, laboratory investigations to exclude any systemic diseases (complete blood count, liver function tests and renal function tests) and an informed consent from all patients after full explanation of the procedure, risks and purpose of the study.

Microneedling was repeated once weekly for 3 months (12 sessions), during which all patients received NB-UVB therapy 3 times per week. Microneedling was performed by dermapen (DR.Pen A6) after cleaning of skin by ethyl alcohol. Dermapen is a pen like instrument with handle, disposable needles and guides (to adjust needle length). It comes with a rechargeable battery. The needle tip has 12 needles with two modes of

operation, high and low speeds. Speed level ring was turned on at the lower speed. Dermapen was set at (needle depth 0.5 to 0.1 mm).

Phototherapy was received via eight NB fluorescent tubes with a spectrum of 310–315 nm and a maximum wave length of 311 nm were installed in a Waldmann UV-1000 unit. Patients then received NB-UVB therapy 3 times per week starting from the day following microneedling, starting with a dose of 0.21 J/cm<sup>2</sup> independent of skin type and increased by 20% every session until we reached the minimal erythema dose. The patient's erythema was evaluated with every clinic visit. No NB-UVB exposure was allowed if erythema was still present before the session. During the NB-UVB sessions, the affected parts were exposed with the eyes protected by UV-blocking goggles.

Evaluation of the treatment was done by photography (Photographs were taken at baseline and before each session using Canon camera 13 Mega Pixels then monthly for 3 months after the last session) and clinical examination to assess the disease severity using Vitiligo Extent Tensity Index (VETI) score (4). The patients were evaluated at every session to report any complications (erythema, pain, ulceration,

burning sensation ecchymosis, infection, post-inflammatory hyperpigmentation or any allergic manifestations). Patients were recurrence, complications or worsening of the lesions.

Statistical analysis was performed using the SPSS (Statistical Package for the Social Sciences) version 25 (IBM Inc., Chicago, IL, USA). Parametric variables (e.g. age) were

## **Results**

Table (1) showed that the age of the patients ranged from 18 to 49 years and more than 66 % of them were females. Their weight

followed up monthly for 3 months after the end of treatment sessions to detect any

expressed as mean and standard deviation (SD) and were compared using F test among the three groups with post hoc (Tukey) test to compare each two groups. Comparison between two variables within the same group was compared by paired T test.

ranged from 61 to 92 kg and their height ranged from 1.55 to 1.67 meter. The range of body mass index of the studied patients was 24 to 35 kg/m<sup>2</sup>. Most patients (66.6 5%) had negative family history of vitiligo.

**Table (1):** Basic characteristics of the patients

Patients (n=15)		
<b>Age (years)</b>	Mean ± SD	33.87±9.08
	Range	18-49
<b>Sex</b>	Male	5 (33.33%)
	Female	10 (66.67%)
<b>Weight (Kg)</b>	Mean ± SD	72.8±8.27
	Range	61-92
<b>Height (m)</b>	Mean ± SD	1.61±0.04
	Range	1.55-1.67
<b>BMI (Kg/m<sup>2</sup>)</b>	Mean ± SD	28.32±3.64
	Range	24.02-35.06
<b>Residency</b>	Urban	7 (46.67%)
	Rural	8 (53.33%)
<b>Family history</b>	Positive	5 (33.33%)
	Negative	10 (66.67%)

**Table (2)** showed the basic characteristics of the vitiligo lesions among the studied patients. According to the type of vitiligo, ten patients showed localized type while five patients showed generalized type. The main site of vitiligo lesions was truncal (53.3%) while the duration of illness ranged from 2 to 6 years.

Patients (n=15)		
<b>Type of vitiligo</b>	Generalized n (%)	5 (33.33%)
	Localized n (%)	10 (66.67%)
<b>Site of lesion</b>	Trunk n (%)	8 (53.33%)
	Head & Neck n (%)	4 (26.67%)
	Proximal n (%)	3 (20%)
<b>Duration of disease (years)</b>	Mean ± SD	3.93±1.49
	Range	2-6

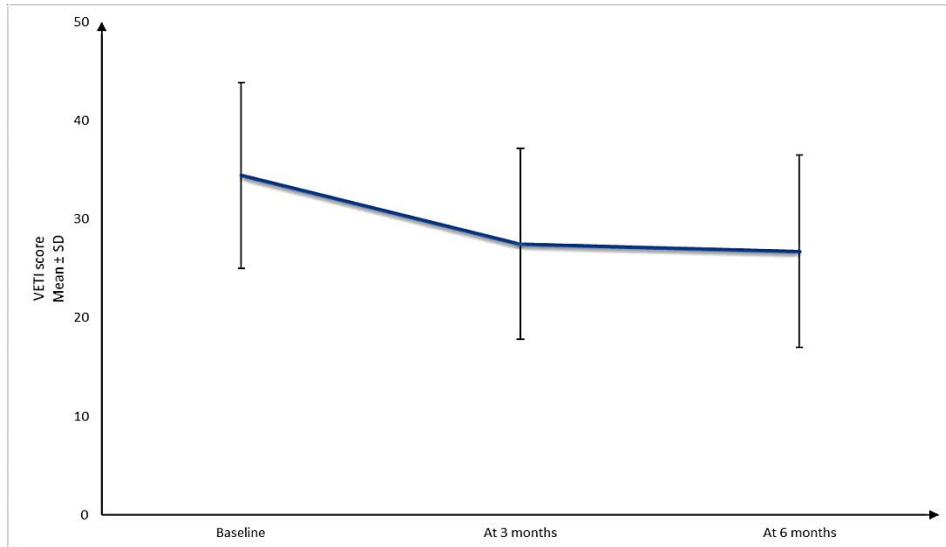
Table (3) and figure (1) showed that the VETI score ranged from 19 – 48 with a mean value of (±SD) 34.47 ± 9.43 at baseline, ranging from 10 – 40 with a mean value of (±SD) 27.47 ± 9.69 at 3 months and ranging from 9 – 40 with a mean value of (±SD) 26.73 ± 9.76 at 6 months. VETI score was significantly lower at 3 and 6 months compared to baseline and at 6 months compared to 3 months ( $p < 0.001$ , **table 3 and figure 1**)

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**Table 3:** VETI score of the studied patients

	At baseline	At 3 months	At 6 months
<b>Mean ± SD</b>	34.47 ± 9.43	27.47 ± 9.69	26.73 ± 9.76
<b>Range</b>	19 – 48	10 - 40	9 - 40
<b>p value</b>		$p1 < 0.001^*$	$p2 < 0.001^*$ $p3 = 0.010^*$

$p1$ :  $p$  value between 3 months and baseline,  $p2$ :  $p$  value between 6 months and baseline,  $p3$ :  $p$  value between 3 months and 6 months, \*: statistically significant as  $p$  value  $< 0.05$ . The analysis was done using F test.



**Figure 1:** VETI score of the studied patients

## Discussion

Numerous therapeutic modalities had been recommended for vitiligo such as phototherapy, topical and systemic corticosteroids, calcineurin inhibitors, vitamin D3 analogue derivatives, 5-fluorouracil, laser therapy, and surgical techniques. However, there is no treatment to ensure complete cure of vitiligo. Therefore, combination therapy is frequently recommended (5).

Microneedling is a minimally invasive procedure that is initially introduced in dermatology for skin rejuvenation. It was recommended for treating resistant localized stable vitiligo either as an exclusive therapy or in combination with NB-UVB phototherapy, or topical therapeutic agents such as triamcinolone acetonide, latanoprost, tacrolimus, 5-fluorouracil, or trichloroacetic acid (6). It induces processes similar to wound

healing with production of cytokines and growth factors beneficial for repigmentation. In addition, it facilitates drug penetration through the skin, which might potentiate their activity (7). Narrow band ultraviolet B (NB-UVB) phototherapy has been used successfully for the treatment of vitiligo (8).

In the current study, the VETI score ranged from 19 – 48 with a mean value of ( $\pm$ SD)  $34.47 \pm 9.43$  at baseline, ranging from 10 – 40 with a mean value of ( $\pm$ SD)  $27.47 \pm 9.69$  at 3 months and ranging from 9 – 40 with a mean value of ( $\pm$ SD)  $26.73 \pm 9.76$  at 6 months in patients' group. VETI score was significantly lower at 3 and 6 months compared to baseline and at 6 months compared to 3 months ( $p < 0.001$ ).

In line with the current study, another study (9) assessed the usefulness of needling as an adjunct to narrowband ultraviolet B therapy in non-responding, localized stable vitiligo cases (16 female and 7 male) having 84 localized vitiligo patches, who did not respond to medical measures neither alone nor in combination with ultraviolet exposures. They mentioned that almost 90 % of the patches showed good to excellent response

after six months of needling with NB-UVB exposures with minimal side effects.

Also, another study (10) enrolled 26 patients with stable generalized intractable vitiligo. The patients received needling for selected patches weekly for 12 weeks. All patients received NB-UVB phototherapy three times a week. In comparison with the baseline, improvement in the mean percentage of repigmentation was significant after 4, 8 and 12 weeks ( $p < 0.0001$ ).

The present study was in accordance with another study (11) who tried to assess the efficacy of NB-UVB therapy with and without needling. The patches included in the study were divided into A and B groups. Both groups received NB-UVB (three/week) for three months. In addition, the B side received needling by insulin syringe. Group B had statistically greater improvement in pigmentation with 41.5% achieving a very good level of repigmentation.

The current study had several limits including small sample size and short follow up period. Further studies are needed with multicenter cooperation to validate our findings and to study the

efficacy of the treatments in patients with active vitiligo, who have other dermatological diseases and suffering from acute and chronic diseases such as (kidney and liver disease, ischemic heart disease or oncological diseases). The present study reconfirmed the efficacy of microneedling in combination with NB-UVB phototherapy in vitiligo treatment. It can be considered a therapeutic option in the management of patients with vitiligo.

## Conclusion

Our study concluded that skin microneedling in combination with NB-UVB phototherapy is a safe and effective treatment option for stable localized vitiligo.

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To cite this article: Asmaa EL Refaey, Sara S. Elsayed, Shymaa M. Rizk. Study the efficacy of Microneedling and Narrow Band Ultraviolet B Phototherapy in Vitiligo Treatment. *BMFJ* 2023;40(annual conference issue):174-181.