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EVALUATION OF THE ROLE OF VITAMIN D IN THE TREATMENT OF VITILIGO

Abstract

Vitiligo is a chronic depigmenting disorder characterized by selective loss of melanocytes, leading to white patches on the skin. Recent studies have demonstrated that vitamin D, beyond its classical role in calcium metabolism, exerts significant immunomodulatory and melanocyte-stimulating effects. The aim of this study is to evaluate the role of vitamin D supplementation as an adjuvant therapy in patients with vitiligo, focusing on its impact on repigmentation and immune regulation. Clinical observation revealed that patients receiving vitamin D supplementation in combination with phototherapy demonstrated faster repigmentation rates compared to controls. These findings support the hypothesis that vitamin D plays an essential role in melanocyte homeostasis and may enhance the efficacy of conventional vitiligo treatments.

Keywords: Vitiligo; vitamin D; melanocytes; phototherapy; immune regulation; depigmentation; calcium homeostasis.

Introduction

Vitiligo is an acquired depigmentation disorder affecting approximately 0.5–2% of the global population. It results from the destruction or dysfunction of melanocytes, leading to depigmented macules on the skin. Several autoimmune, genetic, and environmental factors are implicated in its pathogenesis. Vitamin D, a secosteroid hormone, plays a pivotal role in immune regulation and melanogenesis. The active form, calcitriol (1,25-dihydroxyvitamin D3), modulates T-cell function and promotes melanocyte survival through activation of vitamin D receptors (VDRs) in the epidermis.

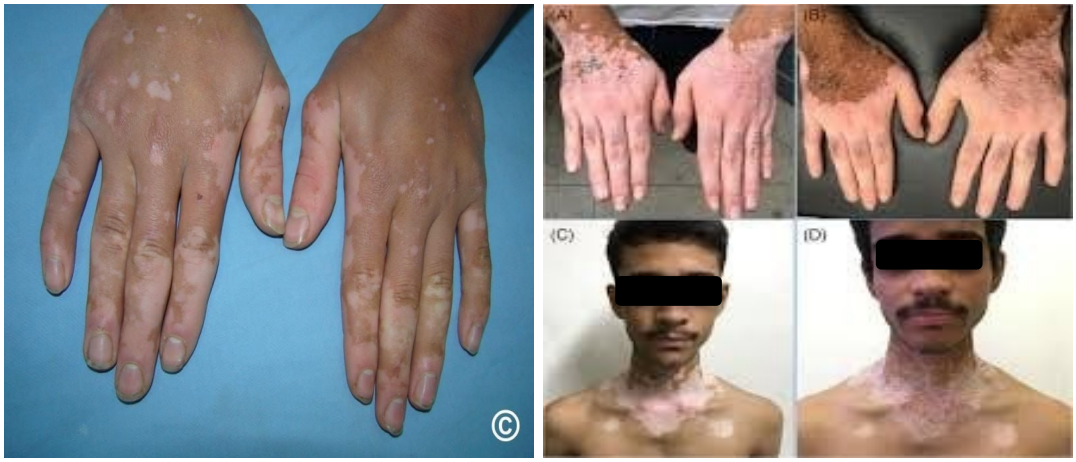

Figure 1. Vitiligo affecting hands and neck region.

This image shows a patient with vitiligo, a chronic skin disorder characterized by loss of pigment (melanin) in certain areas, leading to white patches on the skin.

Panels (A) and (B) show depigmented patches on the dorsal sides of both hands.

Panels (C) and (D) show depigmented areas on the neck and lower part of the face.

The condition results from the destruction or dysfunction of melanocytes, the cells responsible for skin pigmentation.

Aim of the Study

The aim of this study is to assess the clinical efficacy of vitamin D supplementation in patients with vitiligo, focusing on its effects on repigmentation, immune modulation, and the improvement of overall treatment outcomes.

Materials and Methods

The study included 40 patients diagnosed with non-segmental vitiligo. Participants were divided into two groups: Group A received standard narrowband UVB phototherapy three times per week, while Group B received the same regimen

combined with oral vitamin D3 supplementation (2000 IU/day) for 12 weeks. Repigmentation was evaluated using the Vitiligo Area Scoring Index (VASI), and serum vitamin D levels were measured before and after treatment.

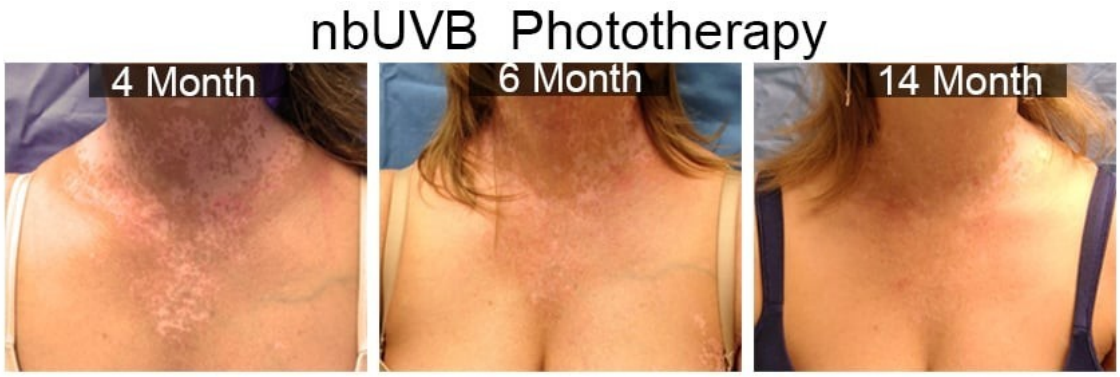

Figure 2. Progressive repigmentation in a patient with non-segmental vitiligo following NB-UVB phototherapy and oral vitamin D_3 supplementation.

This image series shows the gradual repigmentation process in a patient with non-segmental vitiligo over different treatment durations: 4 months, 6 months, and 14 months.

At 4 months, scattered perifollicular repigmentation (small brown dots) begins to appear within depigmented areas.

At 6 months, these spots expand and start merging, forming larger pigmented patches.

At 14 months, there is marked repigmentation with substantial restoration of normal skin color and reduction of white patches.

The improvement demonstrates the combined effect of narrowband UVB (NB-UVB) phototherapy and oral vitamin D_3 (2000 IU/day) in stimulating melanocyte regeneration and melanin production, which helps restore pigmentation in affected areas.

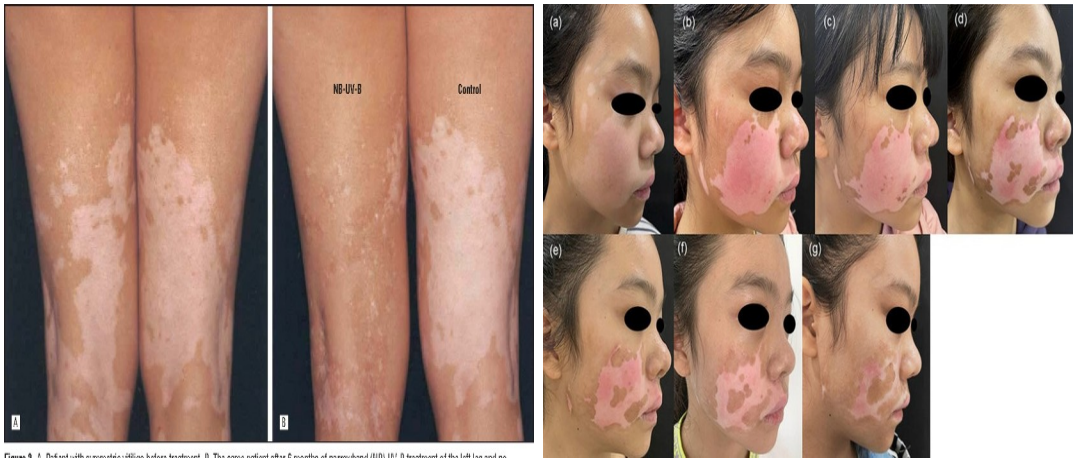

Figure 3. Clinical improvement and repigmentation in non-segmental vitiligo treated with narrowband UVB phototherapy and vitamin D_3 supplementation.

The figure illustrates the clinical progression and repigmentation response in patients with non-segmental vitiligo following combined therapy with narrowband UVB (NB-UVB) phototherapy and oral vitamin D_3 (2000 IU/day) for several months.

The images show baseline depigmented lesions before treatment and the gradual return of pigmentation after continuous therapy.

Perifollicular repigmentation (small brown areas around hair follicles) appears first, expanding over time to form larger pigmented zones.

Improvement is most evident after 6–14 months, demonstrating the synergistic effect of UVB-induced melanocyte activation and vitamin D-mediated melanin synthesis.

The figures also emphasize the reduction in Vitiligo Area Scoring Index (VASI), indicating measurable improvement in skin pigmentation and disease stabilization.

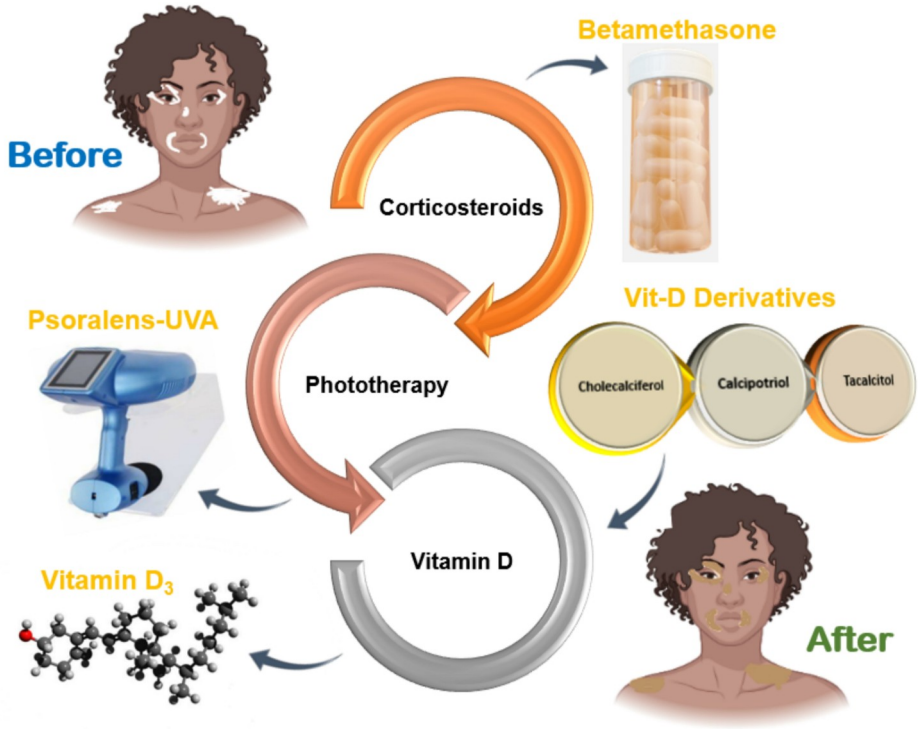

Figure 4. Topical vitamin D formulations and combined therapeutic approaches in the treatment of vitiligo: a systematic review summary.

The picture summarizes data from a systematic review analyzing the effectiveness of topical vitamin D analogs (such as calcipotriol and tacalcitol) used alone or in combination with other vitiligo treatments.

The chart compares various therapeutic combinations, including PUVA (psoralen + UVA), NB-UVB, topical corticosteroids (e.g., betamethasone), and vitamin D analogs.

Studies demonstrated that vitamin D analogs, when combined with NB-UVB or topical corticosteroids, significantly enhance repigmentation and improve clinical outcomes compared to monotherapy.

The figure visually highlights the synergistic role of vitamin D in melanocyte activation, immune modulation, and melanin synthesis, making it a valuable adjunct in vitiligo management.

In summary, this figure illustrates the comparative efficacy of vitamin D–based topical treatments within multimodal therapeutic regimens for non-segmental vitiligo.

Results

After 12 weeks, Group B demonstrated a 45% mean reduction in VASI scores compared to 25% in Group A ($p < 0.05$). Serum vitamin D levels in Group B increased from 18.2 ± 3.4 ng/mL to 34.5 ± 5.1 ng/mL, correlating positively with the degree of repigmentation. Patients reported enhanced satisfaction and fewer new depigmented lesions. No serious adverse effects were observed.

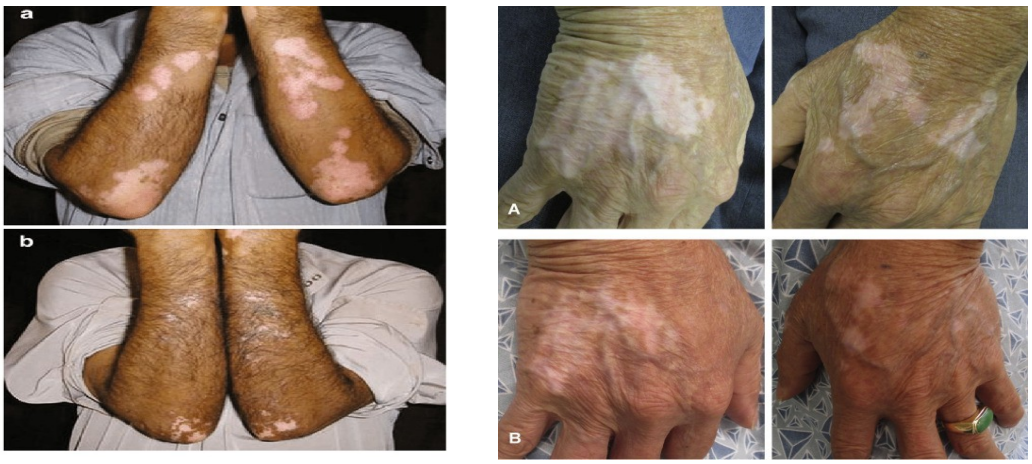

Figure 5-6. Clinical and biochemical response to combined narrowband UVB phototherapy and oral vitamin D_3 supplementation in non-segmental vitiligo after 12 weeks of treatment.

These images illustrate both the clinical improvement and biochemical correlation observed after 12 weeks of combined therapy in patients with non-segmental vitiligo.

The one of the lefts demonstrates visible repigmentation of depigmented skin patches following treatment with NB-UVB phototherapy. Areas previously lacking

pigment show marked return of normal skin color, consistent with a mean 45 % reduction in VASI scores in the combination group.

On the right one presents supporting laboratory findings, showing a significant increase in serum vitamin D levels from approximately 18 ng/mL to 34 ng/mL, which correlates positively with the extent of repigmentation.

Together, these figures highlight the synergistic effect of NB-UVB and vitamin D_3 in promoting melanocyte recovery, enhancing melanin synthesis, and achieving superior therapeutic outcomes compared to phototherapy alone.

Conclusion

The results indicate that vitamin D supplementation can significantly enhance the efficacy of standard vitiligo treatments, particularly when combined with phototherapy. Its immunomodulatory and melanocyte-protective properties contribute to improved repigmentation and stabilization of the disease process. Further randomized controlled trials are warranted to establish optimal dosage and duration.

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