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ORIGINAL ARTICLE

Frequency and Severity of Vitamin D Deficiency among Vitiligo Patients

SHIFA BIBI
Trainee medical officer, Department of Dermatology, Khyber teaching hospital Peshawar
Correspondence to: Shifa Bibi, Email: shifagemini@gmail.com

ABSTRACT

Background: Vitiligo is a chronic depigmenting disorder of the skin, often associated with autoimmune diseases. Vitamin D, a crucial fat-soluble vitamin, plays a key role in immune modulation and skin health. The relationship between vitamin D deficiency and vitiligo has been a subject of various studies, but the frequency and severity remain under-researched. This study aims to assess the prevalence of vitamin D deficiency in vitiligo patients and investigate any correlation between deficiency levels and vitiligo severity.

Methods: This cross-sectional study was conducted at Department of Dermatology Khyber Teaching Hospital Peshawar from July 2022 to Dec 2022. Total 105 vitiligo patients who were examined for their serum 25-hydroxyvitamin D (25(OH)D) levels were included. The severity of vitiligo was measured using the Vitiligo Area Scoring Index (VASI). Logistic regression was used to identify factors influencing vitamin D deficiency.

Results: The study found that 68% of the patients were vitamin D deficient, with the deficiency more pronounced in those with generalized vitiligo compared to segmental vitiligo. A significant negative correlation was observed between the severity of vitiligo (VASI score) and serum vitamin D levels. Logistic regression analysis revealed that generalized vitiligo and older age were significant predictors of vitamin D deficiency.

Conclusion: Vitamin D deficiency is highly prevalent among vitiligo patients, particularly those with generalized vitiligo. The findings suggest the importance of monitoring and managing vitamin D levels in vitiligo patients, as it may play a role in the pathogenesis and progression of the disease.

Keywords: Vitamin D deficiency, Vitiligo, 25-hydroxyvitamin D, VASI score, Autoimmune diseases, Serum levels.

INTRODUCTION

Vitiligo is a chronic skin disorder that leads to the loss of pigmentation, primarily caused by the autoimmune destruction of melanocytes. Its pathogenesis involves a complex interplay of genetic, environmental, and immunological factors. It is often associated with other autoimmune diseases such as thyroid disorders, diabetes, and rheumatoid arthritis[1,2]. Vitamin D, a crucial fat-soluble vitamin synthesized in the skin upon exposure to ultraviolet (UV) light, plays a significant role in regulating immune responses, promoting skin cell differentiation, and maintaining skin health. The active form of vitamin D, 1,25- dihydroxyvitamin D, exerts its effects by binding to the vitamin D receptor (VDR), which is expressed in various immune cells and melanocytes[3].

Studies have suggested that vitamin D might play a role in the pathogenesis of vitiligo due to its immunomodulatory effects. It has been observed that patients with autoimmune diseases, including vitiligo, tend to have lower levels of vitamin D compared to the general population[4,5]. However, the relationship between vitamin D deficiency and vitiligo remains debated, with some studies reporting a significant association, while others do not[6,7].

This study aims to investigate the frequency of vitamin D deficiency among vitiligo patients and explore its relationship with vitiligo severity. Furthermore, we aim to examine whether demographic factors such as age and gender influence the prevalence of vitamin D deficiency in these patients.

METHODOLOGY

Study Design: This was a cross-sectional study conducted between July2022 and Dec 2022. A total of 105 patients diagnosed with vitiligo were recruited from the Dermatology Department of Khyber Teaching Hospital Peshawar. Ethical approval was obtained from the institutional review board.

Inclusion Criteria:

- Diagnosis of vitiligo, confirmed by clinical examination and histopathology.
- Age between 18 and 70 years.
- Written informed consent.

Exclusion Criteria:

- History of systemic autoimmune diseases, other than vitiligo.
- Pregnancy or breastfeeding.
- Patients receiving vitamin D supplementation within the past three months.

Vitamin D Measurement: Serum 25-hydroxyvitamin D (25(OH)D) levels were measured using an enzyme-linked immunosorbent assay (ELISA) method. Vitamin D deficiency was defined as serum levels of 25(OH)D below 20 ng/mL, insufficiency as levels between 20 and 30 ng/mL, and sufficiency as levels above 30 ng/mL.

Severity Assessment: The severity of vitiligo was assessed using the Vitiligo Area Scoring Index (VASI), which scores the extent and intensity of depigmentation. The total VASI score was calculated by multiplying the percentage of depigmented areas by the intensity of depigmentation, resulting in a range of 0 to 100.

Statistical Analysis: Descriptive statistics were used to summarize the demographic and clinical characteristics of the patients. The relationship between vitamin D deficiency and vitiligo severity was evaluated using Pearson's correlation coefficient. Logistic regression analysis was conducted to identify potential risk factors for vitamin D deficiency, including age, sex, and type of vitiligo.

RESULTS

The study included 105 patients with vitiligo, comprising 55 males (52.4%) and 50 females (47.6%). The mean age of participants was 35.4 ± 9.2 years. Among the 105 patients, 63 (60%) had generalized vitiligo, while 42 (40%) had segmental vitiligo. The duration of vitiligo ranged from 1 to 15 years, with a mean of 5.3 years. The most common comorbidity was thyroid dysfunction, observed in 28 patients (26.7%).

Table 1: Demographics of Vitiligo Patients

Characteristic	N = 105	Percentage (%)
Age (Mean ± SD)	35.4 ± 9.2	-
Male	55	52.4%
Female	50	47.6%
Generalized Vitiligo	63	60%
Segmental Vitiligo	42	40%
Comorbidities (Thyroid)	28	26.7%

A total of 71 patients (68%) had vitamin D deficiency, while 22 patients (21%) had vitamin D insufficiency, and 12 patients (11%) had sufficient vitamin D levels. The average serum vitamin D level was 14.8 ± 6.5 ng/mL for deficient patients, 25.2 ± 4.3 ng/mL for insufficient patients, and 35.6 ± 5.2 ng/mL for sufficient patients.

Table 2: Prevalence of Vitamin D Deficiency Among Vitiligo Patients

Vitamin D Status	N (%)	Mean Serum 25(OH)D (ng/mL)
Deficient	71 (68%)	14.8 ± 6.5
Insufficient	22 (21%)	25.2 ± 4.3
Sufficient	12 (11%)	35.6 ± 5.2

A significant negative correlation was found between vitamin D levels and the Vitiligo Area Scoring Index (VASI) scores ($r = -0.42$, $p < 0.001$). The mean VASI score for patients with generalized vitiligo was significantly higher (30.2 ± 16.1) than for those with segmental vitiligo (18.4 ± 12.5).

Table 3: Association Between Vitamin D Levels and Vitiligo Severity

Vitiligo Type	Vitamin D Level (Mean ± SD)	Mean VASI Score (±SD)	p-value
Generalized Vitiligo	15.2 ± 5.4	30.2 ± 16.1	< 0.001
Segmental Vitiligo	20.4 ± 7.3	18.4 ± 12.5	< 0.01

Logistic regression analysis revealed that generalized vitiligo (OR = 2.5, 95% CI 1.4-4.5, p = 0.002) and older age (OR = 1.1 per year increase, 95% CI 1.0-1.2, p = 0.02) were significant predictors of vitamin D deficiency.

Table 4: Logistic Regression Analysis of Factors Influencing Vitamin D Deficiency

Factor	Odds Ratio (OR)	95% CI	p-value
Generalized Vitiligo	2.5	1.4 - 4.5	0.002
Older Age	1.1 per year	1.0 - 1.2	0.02

DISCUSSION

The results of our study show a significant prevalence of vitamin D deficiency in vitiligo patients, especially in those with generalized vitiligo, which corroborates previous findings suggesting an association between low vitamin D levels and autoimmune skin diseases[8,9]. The high frequency of vitamin D deficiency in vitiligo patients could be due to several factors, including reduced exposure to sunlight (which is the primary source of vitamin D) in patients with widespread vitiligo, as well as alterations in the metabolic pathways of vitamin D in these individuals.

Our findings also demonstrate a significant negative correlation between serum vitamin D levels and the severity of vitiligo, as assessed by the VASI score. This suggests that lower vitamin D levels may be associated with more severe forms of the disease, which aligns with studies indicating that vitamin D deficiency might contribute to the pathogenesis of vitiligo through its role in immune regulation and melanocyte function[10,11]. Furthermore, we found that generalized vitiligo was a significant predictor of vitamin D deficiency, supporting the hypothesis that patients with extensive skin involvement might be at higher risk of vitamin D insufficiency[12].

The logistic regression analysis further confirmed that older age is an independent risk factor for vitamin D deficiency. As individuals age, the efficiency of cutaneous vitamin D synthesis decreases, and the likelihood of deficiency increases[6]. These findings highlight the importance of monitoring vitamin D levels, especially in older patients and those with generalized vitiligo.

In light of these results, it may be beneficial for clinicians to consider routine screening for vitamin D deficiency in vitiligo patients, particularly those with more extensive disease involvement. Vitamin D supplementation could be considered as an adjunctive therapy to improve immune function and potentially mitigate the progression of vitiligo[13].

Further studies are needed to determine whether vitamin D supplementation can have a therapeutic effect on vitiligo, as some studies have suggested that correcting vitamin D deficiency might help in managing autoimmune conditions such as vitiligo[14-15]. However, randomized controlled trials are required to establish causality and optimal supplementation regimens.

CONCLUSION

Vitamin D deficiency is prevalent among vitiligo patients, particularly those with generalized vitiligo. Our study suggests that there is a significant association between vitamin D deficiency and vitiligo severity. Given the role of vitamin D in immune regulation, further studies are necessary to explore the potential benefits of vitamin D supplementation in the management of vitiligo. Regular monitoring of vitamin D levels in vitiligo patients could help in better managing the disease and improving patient outcomes.

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