

Frequency and Severity of Vitamin D Deficiency among Vitiligo Patients in Karachi

Rabia Rafique¹, Sadaf Bukhari², Shakila Junaid³, Tooba Malik⁴, Farina Zameer⁵, Neeta Maheshwary⁶

Abstract

Background: Depigmented macules of various shapes are a hallmark of vitiligo, an autoimmune condition brought on by the destruction of melanocytes in the skin. All skin types and both sexes may be affected by the condition, which has been linked to other systemic autoimmune disorders such as scleroderma, lupus erythematosus, alopecia areata and autoimmune thyroiditis.

Objectives: The aim of this study was to assess the frequency and severity of vitamin D deficiency among patients diagnosed with vitiligo.

Methods: This Cross-Sectional study was conducted in the Department of Dermatology Pakistan Navy Station (PNS) Shifa Hospital, Karachi for six months from June 2018 to December 2018. Patients with a clinical diagnosis of vitiligo were enrolled in the study following strict adherence to the defined inclusion and exclusion criteria. A predesigned questionnaire documented demographic factors such as age, name, disease duration and gender. These patients' blood samples were obtained the same day and sent to the pathology lab of PNS Shifa hospital, Karachi to determine their vitamin D levels by radioimmunoassay. Vitamin D levels were documented using a predesigned proforma on the day of reporting.

Results: The patients mean age was 33 ± 19.36 years. A total of 124 patients were included in the study. Among them, 52 (42%) were male and 72 (58%) were female. Vitamin D deficiency was observed in 91 (73%) patients, while 33 (27%) patients had sufficient vitamin D levels.

Conclusion: Vitamin D deficiency was highly prevalent among patients with vitiligo, highlighting the need for routine screening and potential correction as part of comprehensive management strategies.

Keywords: Vitamin D, Deficiency, Vitiligo, Radioimmunoassay, Skin Disease.

Received: 02-08-2024

Revision: 16-02-2025

Accepted: 18-06-2025

Authors Affiliation:

¹Consultant Dermatologist, Mamji Hospital Karachi; ² Senior Registrar of Dermatology BUHSC, PNS Shifa; ³Assistant Professor of Dermatology; BUHSC, PNS Shifa; ⁴Assistant Professor of Dermatology Bahria University Islamabad; ⁵ Senior Registrar; Jinnah Medical & Dental College (JMDC), Karachi. ⁶General Physician, Ziauddin Medical University, Karachi

Corresponding Author: Dr. Rabia Rafique, Consultant Dermatologist, Mamji Hospital Karachi

Email: dr.rabz_chd@hotmail.com

Introduction

Depigmented macules of various shapes are a hallmark of vitiligo, an autoimmune condition brought on by the destruction of melanocytes in the skin.¹ All skin types and both sexes may be affected by the condition, which has been linked to other systemic autoimmune disorders such as scleroderma, lupus erythematosus, alopecia areata and autoimmune thyroiditis.² Regardless of gender or basic skin tone, it affects 1% of the population globally.³ There is significant cosmetic disfigurement

as a result of the condition. Patients with vitiligo may experience emotional and physical effects as well as being stigmatized as social outcasts in some societies.⁴ The literature has reported a wide range of therapeutic medicines, and numerous medications have been used for vitiligo treatment.⁵ No treatment has, however, been discovered to be consistently efficacious. The commonly prescribed treatments are topical corticosteroids and phototherapy.⁶ Many autoimmune diseases, such as diabetes mellitus, systemic lupus erythe-

matusus, multiple sclerosis, Alopecia areata and rheumatoid arthritis are associated with decreased serum vitamin D levels.⁷ The skin produces the hormone vitamin D, which is crucial. The hormone 1,25-dihydroxyvitamin D₃, the active form of vitamin D, affects calcium and bone metabolism, as well as cell division and proliferation, particularly in keratinocytes and melanocytes. It also has some immunoregulatory properties. Via its receptors in macrophages, dendritic cells and B and T lymphocytes, vitamin D may have an impact on both adaptive and innate immunity. Moreover, vitamin D₃ stimulates tyrosinase activity and melanogenesis in melanocytes via the nuclear hormone receptor called vitamin D receptor (VDR).^{8,9} Vitiligo patients have received treatment with topical calcipotriene for their vitiligo.¹⁰ Vitamin D and its equivalents are given for skin treatment, including vitiligo and psoriasis. Vitamin D levels tend to be lower in vitiligo sufferers in numerous investigations.¹¹ In a recent study of Pakistan, it was discovered that deficient vitamin D levels were seen in 17(22.7%) of cases, insufficient in 25(33.3%) patients with vitiligo.¹² While some studies have found decreased levels of vitamin D in vitiligo patients, others have not found such an association.¹³ There aren't many local studies on this subject. These results cannot be applied to our population because it differs from other populations genetically and geographically.

The objective of this study was to assess the frequency and severity of vitamin D deficiency among patients diagnosed with vitiligo. By identifying the frequency, this study will enable early detection and prompt management, which will ultimately improve morbidity rates.

Methods

This cross-sectional study held in the department of Dermatology, PNS Shifa hospital, Karachi for six months from June 2018 to December 2018. Ethical approval for this study was obtained. (Approval No: Ref:32328), and written informed consent was secured from all participants prior to data collection. With the prevalence of VIT D deficiency set at 73%,¹⁴ a 95% confidence interval, 8% margin of error and putting this information in Epi

Info 7; 124 patients were included by non-probability consecutive sampling.

Inclusion Criteria

1. 18 and 60 years of age.
2. Both sexes.
3. Outdoor patients with clinical diagnosis of vitiligo for more than three months, based on the presence of well-demarcated depigmented macules as described in the literature.¹⁵

Exclusion Criteria

1. Individuals with other co-morbidities, such as heart failure (defined as EF>25 on an echocardiogram and renal disease (defined as serum Cr > 3 mg/dl),
2. Blood PTH levels exceeding 10 ng/dL, measured using chemiluminescent immunoassay at the hospital's central laboratory, were considered indicative of endocrine disorders such as hyperparathyroidism.
3. Patients receiving steroid therapy for more than three months, as verified by documented medical prescriptions or clinical records, were excluded from the study.
4. Patients receiving vitamin D treatment >3 months.

Vitiligo cases with a diagnosis were included in the study after meeting the inclusion/exclusion requirements. The researcher gathered information on a predesigned questionnaire on demographic factors such age, name, disease duration and gender. These patients' blood samples were obtained the same day and sent to the pathological lab of P.N.S. Shifa hospital, Karachi to determine their vitamin D levels by radioimmunoassay.

Data were analyzed using SPSS software version 21. Quantitative variables such as age, disease duration, and vitamin D levels were expressed as means and standard deviations. Categorical variables including age group, gender, marital status, employment status, sun exposure, and vitamin D deficiency status (the outcome variable) were presented as frequencies and percentages. The outcome variable, vitamin D deficiency status (classi-

fied as deficient or non-deficient based on lab results), was recorded using a predesigned proforma. Stratification by potential effect modifiers (age, gender, employment status, marital status, disease duration, and sun exposure) was performed. Associations were evaluated using the Chi-square test, with a p-value of <0.05 considered statistically significant.

Results

A total of 124 patients were included in the study. Of these, 52 (42%) were male and 72 (58%) were female. The age distribution showed that the highest number of patients were in the 41–50 year age group. The overall mean age was 33 ± 19.3 years. Analysis of the marital status of 124 patients revealed that 87 (or 70%) were married and 37 (or 30%) were single. Analysis of the employment status of 124 patients revealed that 52 (42%) had jobs while 72 (58%) were unemployed (Table 1).

Of the 124 patients included in the study, 74 patients (60%) had a disease duration of more than 6 months, while 50 patients (40%) had been diagnosed within the past 6 months. Regarding sun exposure, 68 patients (55%) were classified as having inadequate sun exposure, whereas 56 patients (45%) reported adequate sun exposure.

Vitamin D status was categorized as: Deficient: <20 ng/mL, Insufficient: 20–29 ng/mL, Sufficient: ≥30 ng/mL (Figure 1).

Table 2 provide stratification of vitamin D deficiency with respect to gender, age groups, marital status, disease duration, and employment status.

Discussion

Our study found a mean patient age of 33 years (SD ± 19.36), indicating that vitiligo commonly affects young adults but can span a wide age range. This aligns with the known epidemiology of vitiligo, which often has an onset in the second or third decade of life.¹³ The male-to-female ratio in our cohort was 42% to 58%, showing a slight female predominance. Vitiligo is known to affect both sexes without a strong gender bias,¹⁶ so the female majority in our sample

Table 1: Demographic Characteristics of Study Participants (n=124)

Demographic Parameters	Frequency n(%)
Gender	
Male	52(42)
Female	72(58)
Age Groups	
18–30 years	27(22)
31–40 years	31(25)
41–50 years	36(29)
51–60 years	30(24)
Marital Status	
Married	87(70)
Unmarried	37(30)
Employment Status	
Employed	52(42)
Unemployed	72(58)

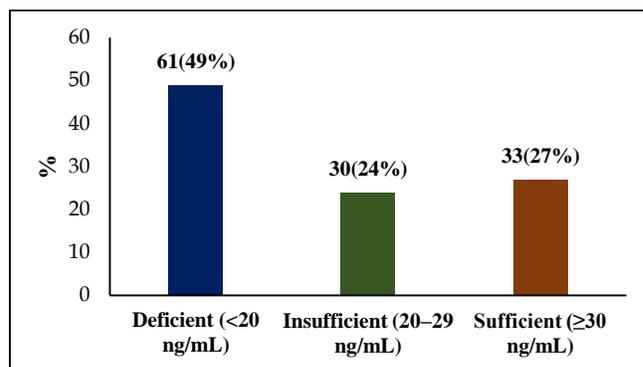


Figure 1: Vitamin D status of Study Participants (n=124)

Table 2: Comparison of Vitamin D Deficiency across Sociodemographics and Clinical Factors (n=124).

	Vitamin D Deficiency (n)		p-value
	Yes	No	
Gender			
Male	38	14	0.042
Female	53	19	
Age Groups			
18–30 years	20	7	
31–40 years	23	8	0.041
41–50 years	26	10	
51–60 years	22	8	
Duration of Vitamin D			
≤ 6 Months	36	14	0.773
> 6 Months	55	19	
Marital Status			
Married	64	23	0.004
Unmarried	27	10	
Employment Status			
Employed	38	14	0.947
Unemployed	53	19	

p-value (2-tailed)

likely reflects a referral pattern or healthcare-seeking differences rather than a true epidemiologic disparity. Importantly, we observed an exceedingly high frequency of vitamin D deficiency among vitiligo patients: 73% had serum levels below the deficiency threshold. This rate of deficiency is strikingly high and reinforces growing evidence that vitiligo patients are often vitamin D deficient. In fact, our finding is consistent with prior studies; reported roughly 71% of vitiligo patients to be vitamin D deficient, a proportion nearly identical to our 73%.¹⁷ Similarly, other contemporary analyses have noted that over three-quarters of vitiligo patients exhibit low vitamin D status.¹⁸ Our results therefore add to a consensus that vitamin D insufficiency is common in vitiligo. Notably, we did not find a significant association between patient age or sex and vitamin D levels – deficiency was prevalent across demographic subgroups, echoing observations by Takci et al, that neither age nor gender significantly influence vitamin D status in vitiligo patients (even though vitiligo patients had lower vitamin D and calcium levels compared to controls in their report).¹⁹

The high prevalence of vitamin D deficiency in our vitiligo cohort parallels findings from diverse populations. A prior study by Silverberg *et al*, in the United States found that while about 56.1% of vitiligo patients had insufficient vitamin D levels, an additional 14.1% were severely deficient – together implying roughly 70% of patients had sub-optimal levels. This is in line with the ~73% deficiency rate we observed.²⁰ Likewise, Varikasuvu *et al*, documented that 73.1% of patients with vitiligo had lower-than-normal 25(OH)D levels, often in conjunction with autoimmune comorbidities, underscoring the link between vitiligo, vitamin D status, and autoimmunity.²¹ Our results are also comparable to the recent cross-sectional study from Iraq by Mahmood and colleagues, who reported that only 6.5% of vitiligo cases had normal vitamin D levels, whereas the vast majority (approximately 76%) were deficient.¹⁷ They noted a slightly higher frequency of deficiency in female patients, though this difference was not statistically significant.¹⁷ For instance, a 2024 case-control study in Kuwait observed lower median vita-

min D levels in vitiligo patients than in controls, but this difference did not reach statistical significance.¹⁶

This study was limited by its cross-sectional design, which restricts causal interpretation between Vitamin D deficiency and vitiligo. Additionally, the absence of a healthy control group and lack of data on confounding factors such as sun exposure and dietary intake may influence the generalizability of the findings. Future research should focus on interventional studies to clarify whether vitamin D supplementation can not only correct a nutritional deficiency but also favorably influence the course of vitiligo.

Conclusion

In summary, our findings reinforce that vitamin D deficiency is common among patients with vitiligo. This adds to the growing recognition of an interplay between vitiligo, autoimmunity, and vitamin D status. While it remains to be definitively proven whether vitamin D deficiency contributes to vitiligo pathogenesis or is primarily a consequence, the consistency of this association across many studies and the mechanistic plausibility of vitamin D's role in immune regulation and melanocyte health suggest that clinicians should be mindful of patients' vitamin D status.

Ethical Approval: This study was approved by Research Evaluation Unit of CPSP vide Ref No. CPSP/REU/DER-2016-197-691.

Conflict of Interest: There was no conflict of interest to be declared by any author.

Funding Source: None.

Author's Contribution

RR: Conception & design, acquisition of data, critical revision of the article, drafting of article.

SB: Conception & design, analysis & interpretation, final approval of the version to be published.

SJ: Acquisition of data, drafting of article, analysis & interpretation of data, drafting of article.

TM: Drafting of article, final approval of the version to be published.

FZ: Drafting of article, analysis & interpretation.

NM: Drafting of article, analysis & interpretation.

References

- Ahmed Jan N, Masood S. Vitiligo. [Updated 2023 Aug 7]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK559149/>
- Carlucci P, Spataro F, Cristallo M, Di Gioacchino M, Netti E, Gangemi S. Immune-Molecular Link between Thyroid and Skin Autoimmune Diseases: A Narrative Review. *J Clin Med*. 2024; 13(18):5594. doi.org/10.3390/jcm13185594
- Seneschal J. Clinical Features of Vitiligo and Social Impact on Quality of Life. *Dermatol Pract Concept*. 2023;13(4S2):e2023312S. Doi: 10.5826/dpc.1304S2a312S.
- Salama AH, Alnemr L, Khan AR, Alfakeer H, Aleem Z, Ali-Alkhateeb M. Unveiling the Unseen Struggles: A Comprehensive Review of Vitiligo's Psychological, Social, and Quality of Life Impacts. *Cureus*. 2023;15(9):e45030. Doi: 10.7759/cureus.45030.
- Kubelis-López DE, Zapata-Salazar NA, Said-Fernández SL, Sánchez-Domínguez CN, Salinas-Santander MA, Martínez-Rodríguez HG, et al. Updates and new medical treatments for vitiligo (Review). *Exp Ther Med*. 2021;22(2):797. Doi: 10.3892/etm.2021.10229.
- Mashreghi Moghadam P, Rasouli SR, Gheybi F, Karimi E, Sahebkar AH. A comprehensive review on present and future of pharmacotherapy of vitiligo disease and potential therapeutic strategies. *Phytomed Plus*. 2023;3(2):100437. Doi: 10.1016/j.phyplu.2023.100437.
- Trefilio LM, Bottino L, de Carvalho Cardoso R, Montes GC, Fontes-Dantas FL. The impact of genetic variants related to vitamin D and autoimmunity: A systematic review. *Heliyon*. 2024;10(7):e27700. Doi: 10.1016/j.heliyon.2024.e27700.
- Uçar N, Holick MF. Illuminating the Connection: Cutaneous Vitamin D3 Synthesis and Its Role in Skin Cancer Prevention. *Nutrients*. 2025; 17(3):386. <https://doi.org/10.3390/nu17030386>
- Mostafa WZ, Hegazy RA. Vitamin D and the skin: Focus on a complex relationship: A review. *J Adv Res*. 2015;6(6):793-804. Doi: 10.1016/j.jare.2014.01.011.
- Travis LB, Silverberg NB. Calcipotriene and corticosteroid combination therapy for vitiligo. *Pediatr Dermatol*. 2004;21(4):495-8. Doi: 10.1111/j.0736-8046.2004.21418.x.
- Navarro-Triviño FJ, Arias-Santiago S, Gilaberte-Calzada Y. Vitamin D and the Skin: A Review for Dermatologists. *Actas Dermosifiliogr (Engl Ed)*. 2019;110(4):262-72. English, Spanish. Doi: 10.1016/j.ad.2018.08.006.
- Khalid A, Rehman F ur, Javed A. Evaluation of Serum Vitamin D Levels in Patients with Vitiligo. *Pak Armed Forces Med J [Internet]*. 2023 Jan. 11 [cited 2025 Apr. 23];72(6):2197-2200.
- Song J, Liu K, Chen W, Liu B, Yang H, Lv L, et al. Circulating Vitamin D Levels and Risk of Vitiligo: Evidence From Meta-Analysis and Two-Sample Mendelian Randomization. *Front Nutr*. 2021;8:782270. Doi: 10.3389/fnut.2021.782270.
- Salim N, Abdul Sattar M, Adnan A. High prevalence of vitamin D deficiency in Pakistan and miscarriages: A hazard to pregnancies. *Ann Med Surg (Lond)*. 2022;82:104634. Doi: 10.1016/j.amsu.2022.104634.
- Alikhan A, Felsten LM, Daly M, Petronic-Rosic V. Vitiligo: A comprehensive overview Part I. Introduction, epidemiology, quality of life, diagnosis, differential diagnosis, associations, histopathology, etiology, and work-up. *J Am Acad Dermatol*. 2011; 65(3):473-91. doi: 10.1016/j.jaad.2010.11.061.
- Albazali A, Sharma A, Altaweel F, Ahmad A, Mandani Y, et al. Vitiligo and Vitamin D Deficiency: A Case-Control Study. *Austin J Dermatolog*. 2024; 11(1): 1111.
- Mahmmod Z, Ismael DK. Vitamin D Deficiency in Patients With Vitiligo: A Cross-Sectional Study From Basrah, Iraq. *Cureus*. 2021;13(12):e20733. doi: 10.7759/cureus.20733.
- Meiyun L, Li X, Xiaoyi L, Dan D. Epidemiologic and clinical differences between early-onset and later-onset childhood vitiligo: A retrospective cohort study. *J Am Acad Dermatol*. 2024;91(1):125-27. Doi: 10.1016/j.jaad.2024.02.047.
- Takci Z, Tekin Ö, Ertuğru DT, Karadağ AS, Akin KO. A case-control study: evaluation of vitamin D metabolism in patients with vitiligo. *Turk J Med Sci*. 2015;45(4):837-41.
- Silverberg JL, Silverberg AI, Malka E, Silverberg NB. A pilot study assessing the role of 25 hydroxy vitamin D levels in patients with vitiligo vulgaris. *J Am Acad Dermatol*. 2010;62(6):937-41. Doi: 10.1016/j.jaad.2009.11.024.
- Varikasuvu SR, Aloori S, Varshney S, Bhongir AV. Decreased circulatory levels of Vitamin D in Vitiligo: a meta-analysis. *A Bras Dermatol*. 2021; 96(3):284-94. doi: 10.1016/j.abd.2020.10.002. Epub 2021 Mar 24. Erratum in: *A Bras Dermatol*. 2021 Nov-Dec;96(6):802. Doi: 10.1016/j.abd.2021.09.001.