Axis Community Research Journal

(ACRJ)

PREVALENCE OF VITAMIN D DEFICIENCY AND ITS ASSOCIATION WITH CHRONIC ECZEMA SEVERITY IN ADULTS

(*Original Research*)

Abdul Wahab Ali[1]*, MBBS, Rawalpindi Medical University, Pakistan, abdulwahabali4376@gmail.com

Abdullah Ayoob[2], (4th Year MBBS) Medicine and Basic Health Sciences, LUMHS, Pakistan, khattiabdullahayoob@gmail.com

Naheed Shah[3], Assistant Professor, Department of Zoology, University of Sindh, Pakistan, naheed.shah@usindh.edu.pk

Acknowledgement:	The authors sincerely thank all participants for their valuable cooperation.
Conflict of interests	None
Corresponding	Abdul Wahab Ali, MBBS, Rawalpindi Medical University, Pakistan, abdulwahabali4376@gmail.com

- **License**: © 2025. Open Access under CC BY 4.0. Copyright retained by authors.
- **Compliance**: Adheres to the ICMJE Recommendations.

Abstract

Background: Vitamin D supports immune regulation and skin barrier integrity. Low levels have been linked to certain inflammatory disorders. Persistent eczema affects many adults and reduces quality of life, although the connection between vitamin D status and severity in adults is unclear.

Objective: To estimate the frequency of vitamin D deficiency and examine its relation to severity in adults with longstanding eczema.

Methods: In this cross-sectional study conducted in Lahore over four months, 110 adults with chronic eczema were included. Demographic and clinical details were recorded. Severity was quantified using the SCORing Atopic Dermatitis (SCORAD) index. Serum 25-hydroxyvitamin D was assayed by chemiluminescence and grouped as deficient (<20 ng/mL), insufficient (20–29 ng/mL), or sufficient (≥30 ng/mL). Descriptive statistics, one-way ANOVA, and Pearson correlation were applied; $p<0.05$ indicated significance.

Results: Mean participant age was 35.2 ± 9.8 years, with 51.8% male. Vitamin D deficiency affected 50 patients (45.5%), insufficiency 41 (37.3%), and sufficiency 19 (17.2%). Overall mean SCORAD score was 40.6 ± 14.1. By vitamin D category, mean SCORAD scores were 39.4 ± 13.1 in deficient patients, 41.4 ± 13.8 in those with insufficiency, and 39.1 ± 16.2 in patients with sufficient levels. No significant correlation existed between serum vitamin D concentration and SCORAD score ($r=0.02$, $p>0.05$).

Conclusion: Suboptimal vitamin D status is frequent in adults with chronic eczema. However, vitamin D levels showed no association with disease severity. These data suggest that, while deficiency often accompanies eczema, adult disease severity depends on other influences beyond vitamin D status.

Keywords: Adult, Chronic Disease, Eczema, Prevalence, SCORAD Index, Severity of Illness Index, Vitamin D

- **License**: © 2025. Open Access under CC BY 4.0. Copyright retained by authors.

Compliance: Adheres to the ICMJE Recommendations.

Introduction

Atopic dermatitis, also known as eczema, is a chronic inflammatory skin condition that persists into adulthood in a considerable proportion of affected individuals. Patients typically experience recurrent pruritus, erythema, and xerosis(1). Although the clinical manifestations are well described, the mechanisms underlying chronicity and varying severity remain incompletely understood and appear multifactorial. Disease expression is influenced by environmental factors, immune dysregulation, and nutritional elements(2). Among these, vitamin D has attracted attention for its roles in immune regulation, epidermal barrier maintenance, and control of inflammation. Yet the relation between vitamin D status and severity of chronic eczema in adults is not fully established(3).

Vitamin D was long recognised primarily for its effects on calcium homeostasis and bone health. More recent work has shown that its active metabolite, calcitriol, modulates innate and adaptive immunity by acting on T cells, B cells, dendritic cells, and keratinocytes(4). These actions are relevant to atopic dermatitis, which features Th2-skewed immunity and impaired barrier function. Vitamin D also induces antimicrobial peptides that strengthen cutaneous defences and may limit secondary infections common in eczema. Such findings raise the possibility that low vitamin D levels contribute to greater disease activity(5).

Vitamin D deficiency affects large populations worldwide, with particularly high rates in South Asia and the Middle East despite ample sunlight—attributable to cultural factors, darker skin pigmentation, and limited dietary intake(6). Patients with chronic inflammatory skin diseases may be at increased risk. In atopic dermatitis, immune alterations and vitamin D insufficiency could interact to influence disease persistence and impact on quality of life(7). Most investigations of vitamin D in atopic dermatitis have focused on children, where associations with severity are more consistently reported. Studies in adults are fewer, and evidence on how deficiency affects disease course in this age group is limited(8). Observational data have sometimes shown inverse relations between serum vitamin D and eczema severity, but results vary across settings owing to differences in geography, season, severity assessment, and study design. Trials of supplementation have yielded mixed outcomes, often constrained by small cohorts and variable protocols(9).

Determining whether vitamin D deficiency acts as a modifiable contributor to eczema severity, or merely a frequent comorbidity, has both mechanistic and practical relevance. A confirmed link could guide screening and integrated management in dermatology, especially in regions where deficiency is common and correction straightforward(10). The current study therefore examines the prevalence of vitamin D deficiency in adults with chronic eczema and its relation to disease severity(11). These data may clarify the place of vitamin D assessment in routine care and inform strategies to reduce disease burden in affected patients.

Methods

This cross-sectional study was conducted over four months in Lahore to determine the prevalence of vitamin D deficiency in adults with chronic eczema and to examine its relation to disease severity. A cross-sectional design permits concurrent assessment of vitamin D status and eczema severity, offering a snapshot of their association. Patients were recruited consecutively from dermatology outpatient clinics. Inclusion criteria comprised adults aged 18–60 years with chronic eczema diagnosed clinically by a consultant dermatologist, where chronicity required symptoms persisting or recurring for at least six months. Exclusion criteria encompassed current use of vitamin D supplements, phototherapy, systemic corticosteroids, or immunosuppressants in the preceding three months, as these might alter vitamin D levels or disease activity. Pregnant or lactating women and those with disorders affecting vitamin D metabolism, such as chronic kidney or liver disease, were also excluded(12).

Sample size was determined using the standard formula for estimating prevalence in cross-sectional studies, assuming a 50% prevalence of vitamin D deficiency from regional data, a 95% confidence level, and 10% margin of error. This yielded a minimum of 96 participants. Enrollment was increased to 110 to accommodate possible incomplete records. A structured proforma recorded demographic details (age, sex, occupation, socioeconomic status, disease duration) and clinical features (age at onset, lesion distribution, family history of atopy, exacerbation frequency). Eczema severity was assessed with the SCORing Atopic Dermatitis (SCORAD) index, which integrates extent, intensity of signs (erythema, oedema/papulation, excoriation, lichenification, oozing/crusts, dryness), and subjective symptoms (pruritus, sleep loss)(13).

- **License**: © 2025. Open Access under CC BY 4.0. Copyright retained by authors.

Compliance: Adheres to the ICMJE Recommendations.

Serum 25-hydroxyvitamin D [25(OH)D] was measured in venous samples using chemiluminescent immunoassay in an accredited laboratory(14). Status was categorised as deficient (<20 ng/mL), insufficient (20–29 ng/mL), or sufficient (≥30 ng/mL)(15). Enrollment was distributed across the study period to minimise seasonal effects, and all assays used the same platform. Data were analysed in SPSS version 26. Continuous variables (age, SCORAD score, 25(OH)D level) were expressed as mean ± standard deviation, categorical variables as frequencies and percentages. Normality was confirmed by the Shapiro-Wilk test, supporting parametric tests. Prevalence of deficiency was reported with 95% confidence intervals. Differences in SCORAD scores across vitamin D categories were tested with one-way ANOVA and pairwise t-tests. The association between continuous 25(OH)D levels and SCORAD scores was assessed by Pearson correlation, with $p<0.05$ denoting significance. Written informed consent was obtained from all participants after full explanation. Data were anonymised with unique identifiers and stored securely. These standardised clinical and laboratory procedures minimised bias and supported reliable estimation of vitamin D deficiency prevalence and its relation to eczema severity in this adult cohort.

Results

We enrolled 110 adults with chronic eczema. Mean age was 35.2 ± 9.8 years (range 19–58 years). Fifty-seven participants (51.8%) were male and 53 (48.2%) female. Mean disease duration was 7.1 ± 2.9 years, with nearly half reporting symptoms for more than five years. Socioeconomic status was low in 40.9%, middle in 44.5%, and high in 14.6%. These characteristics are summarised in table 1.

Vitamin D deficiency (<20 ng/mL) was present in 50 patients (45.5%), insufficiency (20–29 ng/mL) in 41 (37.3%), and sufficiency (≥30 ng/mL) in 19 (17.2%). Vitamin D category distribution is shown in table 2 and figure 1. Mean SCORAD score for the cohort was 40.6 ± 14.1, indicating moderate severity. By vitamin D status, mean scores were 39.4 ± 13.1 in the deficient group, 41.4 ± 13.8 in the insufficient group, and 39.1 ± 16.2 in the sufficient group (table 3).

Pearson correlation between serum 25-hydroxyvitamin D concentration and SCORAD score was weak and non-significant ($r=0.02$, $p>0.05$). These data are presented in table 4 and as a scatter plot in figure 2.

Thus, vitamin D deficiency and insufficiency were common in this adult cohort with chronic eczema, yet disease severity, as measured by SCORAD, remained similar across vitamin D categories. The absence of a meaningful correlation suggests that vitamin D status does not substantially influence eczema severity in these patients.

Table 1: Demographic characteristics of participants (n = 110)

Variable	Mean ± SD / n (%)
Age (years)	35.2 ± 9.8
Gender (Male/Female)	57 (51.8%) / 53 (48.2%)
Disease duration (years)	7.1 ± 2.9
Socioeconomic status (Low/Middle/High)	45 (40.9%) / 49 (44.5%) / 16 (14.6%)

Table 2: Distribution of vitamin D categories

Vitamin D Category	Frequency (n)	Percentage (%)
Deficient (<20 ng/mL)	50	45.5
Insufficient (20–29 ng/mL)	41	37.3
Sufficient (≥30 ng/mL)	19	17.2

- **License**: © 2025. Open Access under CC BY 4.0. Copyright retained by authors.

Compliance: Adheres to the ICMJE Recommendations.

Table 3: Mean SCORAD scores across vitamin D categories

Vitamin D Category	Mean SCORAD ± SD	n
Deficient	39.4 ± 13.1	50
Insufficient	41.4 ± 13.8	41
Sufficient	39.1 ± 16.2	19

Table 4: Correlation between vitamin D levels and SCORAD score

Variable	Correlation Coefficient (r)	p-value
Vitamin D vs SCORAD	0.02	>0.05

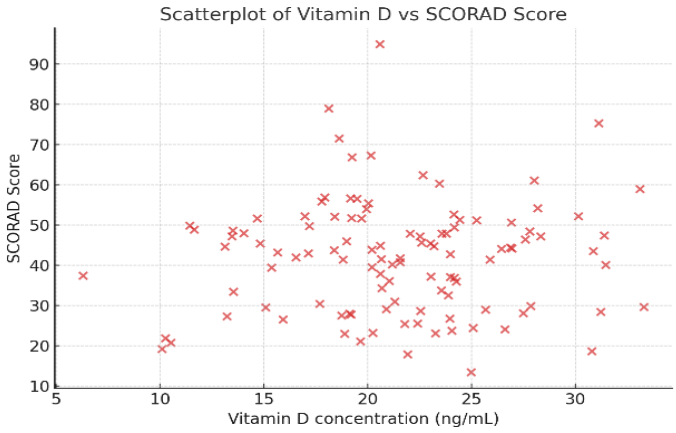

Figure 2 Scatterplot of Vitamin D vs SCORAD Score

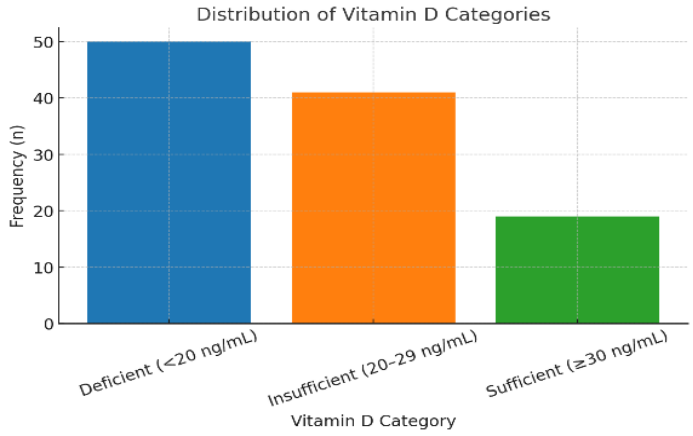

Figure 2 Distribution of Vitamin D Categories

Discussion

In this cohort of adults with chronic eczema, vitamin D deficiency or insufficiency affected nearly 83% of participants. Yet serum 25-hydroxyvitamin D concentrations showed no meaningful relation to disease severity as assessed by the SCORAD index(12). These observations contribute to existing evidence on the place of vitamin D in chronic inflammatory skin disease, where immune dysregulation and barrier impairment predominate(13). The prevalence of suboptimal vitamin D status aligns with rates reported across South Asia and the Middle East, regions where cultural factors, limited dietary sources, and reduced sun exposure sustain widespread deficiency(14). Studies in children with atopic dermatitis have more often reported inverse associations between vitamin D levels and severity, and some supplementation trials have documented clinical improvement(15). In adults, however, results are less consistent. The present findings accord with reports that detected no clear link and indicate that vitamin D status is unlikely to be a major determinant of disease activity in longstanding eczema.

Mean SCORAD scores were similar across deficient, insufficient, and sufficient groups, with considerable overlap in variability. Other elements—genetic susceptibility, environmental triggers, and intrinsic barrier defects—probably exert greater influence on clinical expression than vitamin D alone(16). The lack of a dose-response pattern further suggests that deficiency functions principally as a comorbid condition rather than a direct modulator of severity in this setting(17). Correction of low vitamin D nevertheless offers established benefits for bone health and systemic immunity that extend beyond dermatological concerns.

- **License**: © 2025. Open Access under CC BY 4.0. Copyright retained by authors.

Compliance: Adheres to the ICMJE Recommendations.

Strengths of the study include use of the validated SCORAD instrument, which combines objective signs and subjective symptoms(18), and standardised measurement of serum 25-hydroxyvitamin D by chemiluminescent immunoassay in a single laboratory(19). Consecutive recruitment over a defined period reduced selection bias and reflected the adult eczema population attending urban clinics in a South Asian city.

The cross-sectional design, however, prevents inference about causality or temporal relations between vitamin D status and disease course(20). Although recruitment spanned four months, residual seasonal effects on serum levels cannot be excluded. Data on dietary vitamin D intake, outdoor activity, and clothing practices were not collected, limiting adjustment for these confounders(21). Power was sufficient for prevalence estimation and primary correlation analysis but may have been inadequate to identify modest associations. Finally, conduct in one centre constrains extrapolation to other populations.

These results confirm a high burden of vitamin D deficiency in adults with chronic eczema while showing no association with severity. Routine measurement and correction of deficiency remain advisable for general health. The multifactorial basis of eczema is reinforced, and the data emphasise the complexity of micronutrient contributions to disease control in adult patients(22).

Conclusion

In conclusion, vitamin D deficiency was common among adults with chronic eczema in this urban South Asian cohort, yet no significant relation emerged between vitamin D status and disease severity. These findings underline the need to address deficiency for overall wellbeing and highlight the multiple determinants that govern eczema expression in adulthood.

AUTHOR'S CONTRIBUTIONS

Author	Contribution
Abdul Wahab Ali*	Designed the study, performed data collection and analysis, and prepared the manuscript. Approved the final draft for submission.
Abdullah Ayoob	Contributed to study design, data acquisition, interpretation of findings, and performed critical review and editing of the manuscript. Approved the final draft for submission.
Naheed Shah	Significantly contributed to data collection and analysis. Reviewed and approved the final manuscript for publication.

References

1. Joshi M, Hiremath P, John J, Ranadive N, Nandakumar K, Mudgal JJPR. Modulatory role of vitamins A, B3, C, D, and E on skin health, immunity, microbiome, and diseases. 2023;75(5):1096-114.
2. Umar M, Sastry KS, Al Ali F, Al-Khulaifi M, Wang E, Chouchane AIJSp, et al. Vitamin D and the pathophysiology of inflammatory skin diseases. 2018;31(2):74-86.
3. Mattozzi C, Paolino G, Richetta AG, Calvieri SJTJod. Psoriasis, vitamin D and the importance of the cutaneous barrier's integrity: An update. 2016;43(5):507-14.
4. Papadopoulou SNA, Anastasiou EA, Adamantidi T, Ofrydopoulou A, Letsiou S, Tsoupras AJAS. A comprehensive review on the beneficial roles of vitamin D in skin health as a bio-functional ingredient in nutricosmetic, cosmeceutical, and cosmetic applications. 2025;15(2):796.

- **License**: © 2025. Open Access under CC BY 4.0. Copyright retained by authors.

Compliance: Adheres to the ICMJE Recommendations.

5. Mesquita KdC, Igreja ACdSM, Costa IMCJAbdd. Atopic dermatitis and vitamin D: facts and controversies. 2013;88(6):945-53.

6. Przechowski K, Krawczyk MN, Krasowski R, Pawliczak R, Kleniewska PJN. Vitamin D and Atopic Dermatitis—A Mere Correlation or a Real Supportive Treatment Option? 2025;17(16):2582.

7. Ambagaspitiya SS, Appuhamillage GA, Wimalawansa SJJFiB-L. Impact of Vitamin D on Skin Aging, and Age-Related Dermatological C

8. onditions. 2025;30(1):25463.

9. Li C-P, Huang S-C, Hsiao Y, Tsai R-YJIJoMS. Evaluating the Role of Vitamin D in Alleviating Chronic Pruritus: A Meta-Analysis. 2024;25(18):9983.

10. Passeron T, Krutmann J, Andersen M, Katta R, Zouboulis CJJotEAoD, Venereology. Clinical and biological impact of the exposome on the skin. 2020;34:4-25.

11. Hartmann B. Vitamin D receptor activation modulates the allergic immune response. 2011.

12. Mărginean CO, Meliț LE, Borka Balas R, Văsieșiu AM, Fleșeriu TJD. The crosstalk between vitamin D and pediatric digestive disorders. 2022;12(10):2328.

13. El Taieb MA, Fayed HM, Aly SS, Ibrahim AKJD. Assessment of serum 25-hydroxyvitamin d levels in children with atopic dermatitis: correlation with SCORAD index. 2013;24(6):296-301.

14. Daniluk U, Filimoniuk A, Kowalczuk-Krystoń M, Alifier M, Karpińska J, Kaczmarski MG, et al. Association of antioxidants and vitamin D level with inflammation in children with atopic dermatitis. 2019;58(9):1056-61.

15. Rodrigues I, Gonçalo MJPJoD, Venereology. Atopic dermatitis and vitamin D. 2024;82(2).

16. Kisielienė I. Assessment of endogenous and exogenous factors in children's atopic dermatitis and the impact of the disease on quality of life and behavioral difficulties: Vilniaus universitetas.; 2024.

17. Samochocki Z, Bogaczewicz J, Jeziorkowska R, Sysa-Jędrzejowska A, Glińska O, Karczmarewicz E, et al. Vitamin D effects in atopic dermatitis. 2013;69(2):238-44.

18. Argano C, Torres A, Orlando V, Cangialosi V, Maggio D, Pollicino C, et al. Molecular Insight into the Role of Vitamin D in Immune-Mediated Inflammatory Diseases. 2025;26(10):4798.

19. Bukvić Mokos Z, Tomić Krsnik L, Harak K, Marojević Tomić D, Tešanović Perković D, Vukojević MJIJoMS. Vitamin D in the Prevention and Treatment of Inflammatory Skin Diseases. 2025;26(11):5005.

20. Papa V, Li Pomi F, Minciullo PL, Borgia F, Gangemi SJIJoMS. Skin Disorders and Osteoporosis: Unraveling the Interplay Between Vitamin D, Microbiota, and Epigenetics Within the Skin–Bone Axis. 2024;26(1):179.

21. Anand B. Effect of Vitamin D Supplementation on the Severity of Atopic Dermatitis: PSG Institute of Medical Sciences and Research, Coimbatore; 2020.

22. Costa IMCJABD. Dermatologists still not convienced that Vitamin D reduces atopic dermatitis–Review Dec 2013. 2013;88(6):945-53.

23. Ortiz-Prado E, Vasconez-Gonzalez J, Izquierdo-Condoy JS, Suárez-Sangucho IA, Prieto-Marín JG, Villarreal-Burbano KB, et al. Cholecalciferol (vitamin D3): efficacy, safety, and implications in public health. 2025;12:1579957.

- **License**: © 2025. Open Access under CC BY 4.0. Copyright retained by authors.

Compliance: Adheres to the ICMJE Recommendations.