Modern American Journal of Biological and Environmental Sciences
ISSN (E): 3067-7920
Volume 01, Issue 09, December, 2025
Website: usajournals.org

THE ROLE OF VITAMIN D IN THE SEVERITY OF ATOPIC DERMATITIS: A LITERATURE REVIEW

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Abstract
Atopic dermatitis (AD) is a chronic inflammatory disease characterized by impaired skin barrier and immune regulation. Vitamin D is considered a factor potentially influencing disease severity.
Objective. To assess the role of vitamin D in the pathogenesis of atopic dermatitis and to examine current data on the relationship between 25(OH)D levels and the severity of clinical manifestations of AD.
Methods. A review of publications from 2014–2024 was conducted in PubMed, Scopus, and Web of Science, including clinical, experimental, and randomized trials. Vitamin D levels, SCORAD/EASI indices, and the results of interventional studies were considered.
Results. Most observational studies confirm an inverse relationship between 25(OH)D levels and AD severity. Vitamin D deficiency is associated with more severe itching, impaired skin barrier function, an enhanced Th2 response, and a risk of bacterial complications. Several RCTs have noted a moderate improvement in SCORAD in patients with vitamin D deficiency. However, the results remain inconclusive due to variability in doses and study design.
Conclusions. Low vitamin D levels are associated with more severe AD. Vitamin D can be used as adjunctive therapy for deficiency; however, further large-scale studies are needed to clarify optimal dosages and select target patient groups.

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Keywords: Atopic dermatitis; vitamin D; 25(OH)D; immune regulation; skin barrier; SCORAD; disease severity.

Introduction

Atopic dermatitis is one of the most common chronic inflammatory skin diseases. Its pathogenesis includes disruption of the epidermal barrier, Th2-mediated inflammation, severe pruritus, and a predisposition to secondary infections. In recent years, increasing attention has been paid to the role of vitamin D as a possible disease severity modifier.

Vitamin D deficiency is widespread worldwide, particularly in regions with limited sun exposure. Accumulating evidence suggests a correlation between reduced 25(OH)D levels and more severe clinical manifestations of AD. This suggests that vitamin D may be a potential adjunct in patient management.

Methods

A literature search was conducted in PubMed, Scopus, and Web of Science from 2014 to 2024. The keywords used were: atopic dermatitis, vitamin D, 25(OH)D, epidermal barrier, SCORAD, and dermatitis severity. Studies were included that addressed:

• vitamin D levels in patients with AD;
• the relationship between 25(OH)D levels and clinical indices;
• mechanistic aspects of vitamin D effects;
• randomized clinical trials of deficiency correction.

Results

1. Vitamin D levels and the severity of atopic dermatitis

Numerous studies confirm:

• lower vitamin D levels in patients with AD;
• an inverse correlation between 25(OH)D concentrations and SCORAD/EASI scores;

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• an association between vitamin D deficiency and increased itching, dryness, and inflammation.

It was also noted that low vitamin D levels are associated with increased colonization by Staphylococcus aureus and increased TEWL. 2. Immunological and Barrier Mechanisms

The main mechanisms of vitamin D action include:

• stimulation of the synthesis of antimicrobial peptides (cathelicidin);
• suppression of Th2 cytokine activity (IL-4, IL-5, IL-13);
• improvement in the synthesis of lipids and epidermal barrier proteins;
• reduction in inflammatory activity and strengthening of tight intercellular junctions.

This explains the association between vitamin D deficiency and exacerbation of clinical symptoms.

3. Clinical Trials of Vitamin D Efficacy

The results of RCTs are mixed:

• patients with severe deficiency show a decrease in SCORAD after 4–12 weeks of vitamin D treatment;
• the effect is more noticeable in winter;
• some studies did not reveal a significant improvement, likely due to normal baseline vitamin D levels or a short observation period.

Overall, the data indirectly support a moderate beneficial effect of vitamin D in deficiency patients.

Discussion

Available data demonstrate a significant association between vitamin D levels and the severity of AD, consistent with known pathogenesis mechanisms. However, the lack of standardized dosages and differences in study design limit the ability to formulate universal recommendations.

It is suggested that patients with severe deficiency, seasonal exacerbations, and high levels of Th2 activity may benefit most from vitamin D supplementation.

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Conclusion

Vitamin D plays an important role in immune regulation and maintenance of the skin barrier. Vitamin D deficiency is associated with a more severe course of atopic dermatitis and increased inflammatory activity. Vitamin D correction may be considered as an additional therapeutic strategy, but further large-scale studies are required.

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