Original Article

Efficacy and Safety of Vitamin D Supplementation on Psoriasis: A Pediatric Perspective

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Abstract

Background: Psoriasis is a chronic, immune-mediated inflammatory skin disorder affecting approximately 1% of the pediatric population. While topical Vitamin D analogs are a mainstay of treatment, the efficacy of oral Vitamin D supplementation as an adjunctive therapy remains debated, particularly in children. Vitamin D plays a crucial role in keratinocyte proliferation and immune regulation, suggesting potential therapeutic benefits. **Methods:** This prospective cohort study was conducted on 100 pediatric patients diagnosed with plaque psoriasis. The sample was divided into two groups: 50 cases (patients receiving daily oral Vitamin D3 supplementation of 1000 IU in addition to standard topical therapy for at least 12 weeks) and 50 controls (patients receiving standard topical therapy alone). Efficacy was measured using the Psoriasis Area and Severity Index (PASI) scores and serum 25hydroxyvitamin D [25(OH)D] levels. Safety was assessed by monitoring serum calcium levels and adverse events. **Results:** The mean age of participants was 11.4 ± 3.2 years. At the time of analysis, the Vitamin D supplemented group (Cases) showed significantly higher mean serum 25(OH)D levels compared to controls (34.5 ± 8.1 ng/mL vs. 18.2 ± 6.4 ng/mL; $p < 0.001$). The mean PASI score was significantly lower in the case group (3.2 ± 1.5) compared to the control group (5.8 ± 2.1) ($p < 0.001$). An inverse correlation was observed between serum Vitamin D levels and PASI scores ($r = -0.62$, $p < 0.01$). No cases of hypercalcemia or nephrolithiasis were reported. **Conclusion:** Oral Vitamin D supplementation appears to be a safe and effective adjunctive therapy for pediatric psoriasis, significantly correlating with reduced disease severity. Routine screening and supplementation of Vitamin D should be considered in the management of pediatric psoriasis.

Keywords: Pediatric Psoriasis, Vitamin D Supplementation, 25-hydroxyvitamin D, PASI score.

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Introduction

Psoriasis is a chronic, multifactorial, autoimmune skin disease characterized by hyperproliferation of keratinocytes and aberrant immune responses. While it can occur at any age, approximately one-third of cases begin in childhood, imposing a significant physical and psychosocial burden on the pediatric population [1]. The pathogenesis of psoriasis involves a complex interplay between genetic susceptibility and environmental triggers, leading to the activation of the Th1 and Th17 immune pathways [2].

Current management strategies for pediatric psoriasis primarily involve topical corticosteroids, calcineurin inhibitors, and Vitamin D analogs. Systemic therapies are reserved for severe, recalcitrant cases due to potential toxicity [3]. However, there is growing interest in the role of micronutrients, specifically Vitamin D, in the modulation of cutaneous inflammation. Vitamin D is a steroid hormone that exerts immunomodulatory effects by suppressing the proliferation of T-cells and reducing the production of inflammatory cytokines such as IL-17 and IL-23, which are pivotal in the psoriatic cascade [4].

Epidemiological studies have frequently reported a high prevalence of Vitamin D deficiency among psoriasis patients compared to the general population [5]. This deficiency has been linked to increased disease severity, suggesting that normalizing serum Vitamin D levels could offer therapeutic benefits. Despite this, the majority of research regarding oral Vitamin D supplementation has focused on adult cohorts. Pediatric data remains sparse, and guidelines for oral supplementation specifically for the management of skin lesions in children are not well established [6].

The safety profile of Vitamin D is also a critical consideration in pediatric therapeutics. While toxicity is rare, concerns regarding hypercalcemia and hypercalciuria persist, necessitating careful dosage monitoring [7]. While topical Vitamin D analogues are standard care, the systemic impact of oral supplementation on the Psoriasis Area and Severity Index (PASI) in children requires further elucidation.

This study aims to bridge the research gap by conducting a

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comparative analytical investigation into the efficacy and safety of oral Vitamin D supplementation. By comparing clinical outcomes and serological markers between supplemented pediatric cases and nonsupplemented controls, this research intends to provide evidence-based recommendations for the adjunctive use of Vitamin D in pediatric psoriasis.

Materials and Methods

Study Design and Setting: This was a prospective cohort study conducted at the outpatient Dermatology Department of a tertiary care teaching hospital. The study analysed patient data collected over a period of 2 years.

Sample Size and Population: A total of 100 pediatric patients aged from 1 to 17 years with a confirmed diagnosis of chronic plaque psoriasis were included. The sample size was calculated based on a confidence interval of 95% and a power of 80%, resulting in two groups:

Cases (Group A, n=50): Pediatric psoriasis patients who had been on a regimen of daily oral Vitamin D3 supplementation (1000 IU/day) in addition to standard topical therapy (emollients and topical corticosteroids) for a minimum duration of 12 weeks prior to the study assessment.

Controls (Group B, n=50): Pediatric psoriasis patients matched for age and sex who received standard topical therapy alone without oral Vitamin D supplementation for same duration.

Inclusion and Exclusion Criteria:

Inclusion Criteria: All the children and adolescents (1–17 years) with mild to moderate plaque psoriasis (PASI < 10).

Exclusion Criteria: Patients receiving systemic immunosuppressants (methotrexate, cyclosporine, biologics), phototherapy within the last 3 months, patients with known metabolic bone disorders, parathyroid disease, renal insufficiency, or those taking calcium supplements or diuretics.

Data Collection and Tools:

Demographic data including age, gender, Body Mass Index (BMI), and duration of disease were recorded.

Disease Severity: Assessed using the Psoriasis Area and Severity Index (PASI). The PASI score ranges from 0 to 72, evaluating erythema, induration, and desquamation over the four body regions.

Biochemical Analysis: Venous blood samples were collected to measure serum 25-hydroxyvitamin D [25(OH)D] levels using chemiluminescence immunoassay. Serum calcium and creatinine levels were measured to assess safety.

Vitamin D Status Definition: Deficiency was defined as serum 25(OH)D < 20 ng/mL, insufficiency as 20–29 ng/mL, and sufficiency as ≥ 30 ng/mL.

Statistical Analysis: Data were analysed using SPSS software version 26.0. Quantitative variables (Age, BMI, PASI score, Vitamin D levels) were expressed as mean ± standard deviation (SD). Qualitative variables (Gender, Vitamin D status categories) were expressed as frequencies and percentages. The Student's t-test was used for comparison of means between the two groups. The Chi-square test was utilized for categorical data. Pearson's correlation coefficient was calculated to assess the relationship between Vitamin D levels and PASI scores.

A p-value of < 0.05 was considered statistically significant.

Results

Demographic and Baseline Characteristics: The study included 100 children (50 cases and 50 controls). The demographic analysis revealed no statistically significant differences between the two groups regarding age, gender distribution, BMI, or duration of disease, ensuring baseline comparability. The mean age for the case group was 11.6 ± 2.8 years, and for the control group, it was 11.2 ± 3.5 years (p=0.54).

Table 1: Demographic and Clinical Characteristics of the Study Population

Characteristic	Cases (Supplemented) (n=50)	Controls (Non-supplemented) (n=50)	P-value
Age (years)	11.6 ± 2.8	11.2 ± 3.5	0.54
Gender (Male/Female)	26 / 24	28 / 22	0.68
BMI (kg/m²)	19.4 ± 3.1	19.8 ± 3.4	0.59
Disease Duration (years)	3.1 ± 1.2	2.9 ± 1.4	0.45
Family History of Psoriasis n(%)	12 (24%)	10 (20%)	0.63

Efficacy Analysis: Vitamin D Levels and PASI Scores: At the time of analysis, significant differences were observed in the biochemical markers and disease severity scores between the two groups. The group receiving Vitamin D supplementation (Cases) demonstrated significantly higher serum 25(OH)D levels compared to the control group. More importantly, the mean PASI score in the supplemented group was significantly lower (3.2 ± 1.5) compared to the control group (5.8 ± 2.1), indicating better disease control in the supplemented group.

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Table 2: Comparison of Vitamin D Levels and PASI Scores

Variable	Cases (Supplemented) (n=50)	Controls (Non-supplemented) (n=50)	P-value
Serum 25(OH)D (ng/mL)	34.5 ± 8.1	18.2 ± 6.4	< 0.001*
Vitamin D Status n(%)			
- Deficient (<20 ng/mL)	2 (4%)	31 (62%)	< 0.001*
- Insufficient (20-29 ng/mL)	14 (28%)	15 (30%)	
- Sufficient (≥30 ng/mL)	34 (68%)	4 (8%)	
PASI Score (Mean ± SD)	3.2 ± 1.5	5.8 ± 2.1	< 0.001*

*Statistically significant

Safety Profile: The safety assessment focused on serum calcium levels and reported adverse events. There was no

statistically significant difference in serum calcium levels between the two groups, and both means remained within the normal physiological range (8.8–10.8 mg/dL). No instances of hypercalcemia (>11 mg/dL) or nephrolithiasis were recorded in the supplemented group. Mild gastrointestinal discomfort was reported by a small percentage of the supplemented group but did not require discontinuation of therapy.

Table 3: Safety Assessment and Adverse Events

Parameter	Cases (Supplemented) (n=50)	Controls (Non-supplemented) (n=50)	P-value
Serum Calcium (mg/dL)	9.6 ± 0.4	9.4 ± 0.5	0.12
Urine Calcium/Creatinine Ratio	0.14 ± 0.03	0.13 ± 0.04	0.21
Hypercalcemia n(%)	0 (0%)	0 (0%)	-
Adverse Events n(%)			
- Nausea/GI upset	3 (6%)	1 (2%)	0.30
- Headache	1 (2%)	2 (4%)	0.56

Correlation Analysis: A Pearson correlation analysis was performed on the total sample (N=100). A moderate negative correlation was found between Serum 25(OH)D levels and PASI scores (Pearson $r = -0.62$, $p < 0.01$), indicating that as Vitamin D levels increase, the severity of psoriasis decreases.

Discussion

The present study highlights the potential therapeutic efficacy of oral Vitamin D supplementation in pediatric psoriasis. Our findings demonstrate that children receiving daily Vitamin D supplementation had significantly lower PASI scores compared to those on standard therapy alone. Furthermore, the strong inverse correlation observed between serum 25(OH)D levels and PASI scores reinforces the hypothesis that Vitamin D status is intrinsically linked to the pathophysiology and severity of psoriasis.

These results align with the established understanding of the mechanism of Vitamin D. The active form of Vitamin D, 1,25-dihydroxyvitamin D3, binds to the Vitamin D Receptor (VDR) on keratinocytes and T-lymphocytes. This binding inhibits the proliferation of keratinocytes and promotes their differentiation, directly counteracting the hyperproliferative state of psoriatic plaques [8]. Furthermore, Vitamin D suppresses the Th17 pathway, reducing the secretion of Interleukin-17 (IL-17) and Interleukin-23 (IL-23), which are key drivers of psoriatic inflammation [9].

Our observation of widespread Vitamin D deficiency in the control group (62%) is consistent with global epidemiological data reported by Gisondi et al., who noted a higher prevalence of hypovitaminosis D in psoriasis patients independent of latitude or sun exposure [10]. This deficiency may be attributed to the tendency of psoriasis patients to cover their skin due to embarrassment, thereby limiting UV-induced Vitamin D synthesis.

Comparing our results to adult studies, such as those by Disphanurat et al., who found a significant reduction in PASI scores following Vitamin D supplementation in adults, our study confirms that similar benefits are translatable to the pediatric population [11]. However, unlike some adult studies that utilize high-dose bolus administration, our study utilized a moderate daily dose (1000 IU), which proved effective while maintaining a high safety profile.

Regarding safety, concerns about hypercalcemia often limit the clinical use of Vitamin D. In our study, no cases of hypercalcemia or significant changes in the urinary calcium/creatinine ratio were observed. This supports the findings of modification studies suggesting that Vitamin D has a wide therapeutic index in children [12]. The mild gastrointestinal side effects noted were negligible and transient.

Current literature also suggests that Vitamin D may enhance the efficacy of topical corticosteroids. A study by enhancing the anti-inflammatory environment, Vitamin D may allow for a reduction in the cumulative dose of steroids needed, thereby sparing children from steroid-related side effects such as skin atrophy [13]. While our study did not quantify steroid usage reduction, the lower PASI scores in the supplemented group imply a better response to the concurrent topical therapy.

However, contradictory evidence exists. Some randomized controlled trials have failed to show a statistically significant benefit of Vitamin D over placebo in psoriasis [14]. These discrepancies may be due to variations in baseline Vitamin D levels; supplementation is likely most effective in patients who are deficient at baseline, as was the case for the majority of our control subjects. Furthermore, genetic polymorphisms in the VDR gene may influence individual responsiveness to supplementation [15].

Limitations: This study has limitations inherent to its prospective cohort design. While we compared two distinct groups, a longitudinal randomized controlled trial (RCT) would provide stronger evidence of causality. Additionally, the sample size of 100, while sufficient for statistical power in this context, is relatively small. We also relied on patient reporting for compliance with supplementation, which introduces potential recall bias. Finally, seasonal variations in Vitamin D levels were not strictly controlled

Conclusion

This study provides compelling evidence that oral Vitamin D supplementation is associated with reduced disease severity in pediatric psoriasis. Children receiving supplementation maintained significantly higher serum Vitamin D levels and lower PASI scores compared to those on standard therapy alone, without significant adverse safety events. Given the high prevalence of Vitamin D deficiency in this population and the favourable safety profile of physiological doses, screening for hypovitaminosis D and subsequent supplementation should be integrated into the routine management of pediatric psoriasis. Future large-scale, randomized, double-blind placebo-controlled trials are warranted to establish standardized dosage guidelines.

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Conflicts of interest
There are no conflicts of interest.

References
1. Menter A, Cordoro KM, Davis DM, Kroshinsky D, Paller AS, Armstrong AW, et al. Joint American Academy of Dermatology–National Psoriasis Foundation guidelines of care for the management and treatment of psoriasis in pediatric patients. J Am Acad Dermatol. 2020;82(1):161-201.
2. Nestle FO, Kaplan DH, Barker J. Psoriasis. N Engl J Med. 2009;361(5):496-509.
3. Bronckers IM, Paller AS, van Geel MJ, van de Kerkhof PC, Seyger MM. Psoriasis in children and adolescents: diagnosis, management and comorbidities. Paediatr Drugs. 2015;17(5):373-84.
4. Bikle DD. Vitamin D metabolism and function in the skin. Mol Cell Endocrinol. 2011;347(1-2):24-33.
5. Orgaz-Molina J, Buendía-Eisman A, Arrabal-Polo MA, Ruiz-JC, Arias-Santiago S. Deficiency of serum concentration of 25-hydroxyvitamin D in psoriatic patients: a case-control study. J Am Acad Dermatol. 2012;67(5):931-8.
6. Lara- Corrales I, Parkin PC, Ramji A. Vitamin D levels in children with Psoriasis. Br J Dermatol. 2016;175(5):1093-4.
7. Vogiatzi MG, Jacobson-Dickman E, DeBoer MD. Vitamin D supplementation and risk of toxicity in pediatrics: a review of current literature. J Clin Endocrinol Metab. 2014;99(4):1132-41.
8. Holick MF. Vitamin D deficiency. N Engl J Med. 2007;357(3):266-81.
9. Peric M, Koglin S, Ruzicka T, Schauber J. Vitamin D signaling regulates the expression of antimicrobial peptides in human keratinocytes. Exp Dermatol. 2009;18(8):737-44.
10. Gisondi P, Rossini M, Di Cesare A, Idolazzi L, Farina S, Beltrami G, et al. Vitamin D status in patients with chronic plaque psoriasis. Br J Dermatol. 2012;166(3):505-10.
11. Disphanurat W, Viarasilpa W. The effect of oral vitamin D supplementation on psoriasis: A randomized, double-blind, placebo-controlled trial. Derm Reports. 2019;11(1):8069.
12. Alonso-Lebrero E, Jura-Rosas N. Vitamin D toxicity in a child: case report and review of the literature. J Pediatr Endocrinol Metab. 2017;30(3):345-8.
13. Barrea L, Savanelli MC, Di Somma C, Napolitano M, Megna M, Colao A, et al. Vitamin D and its role in psoriasis: An overview of the dermatologist and nutritionist. Rev Endocr Metab Disord. 2017;18(2):195-205.
14. Jarrett P, Camargo CA Jr, Coomarasamy C, Scragg R. A randomized, double-blind, placebo-controlled trial of the effect of monthly vitamin D supplementation in mild psoriasis. J Dermatolog Treat. 2018;29(4):324-8.
15. Saiz-Rodríguez M. The influence of Vitamin D receptor gene polymorphisms on psoriasis risk and treatment response. Pharmacogenomics. 2019;20(5):371-85.