

EFFECTIVENESS, OUTCOME, AND SAFETY OF VITAMIN D SUPPLEMENTATION IN PATIENTS WITH PSORIASIS: A COMPREHENSIVE SYSTEMATIC REVIEW

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ABSTRACT

Background: *Insights into psoriasis as a systemic ailment have spurred the investigation of novel therapies due to dissatisfaction with current treatments and significant quality of life impairment. Vitamin D3 deficiency is implicated in psoriasis pathophysiology, with studies highlighting its impact on keratinocyte regulation and autoimmune disease resistance. This review critically evaluates evidence on high-dose oral vitamin D3 supplementation for psoriasis management, aiming to assess its effectiveness, treatment outcomes, and safety profile to inform clinician.*

Methods: *This systematic review focused on full-text English literature published between 2017 and 2024 using the PRISMA 2020 guidelines. Editorials and review pieces published in the same journal as the submission without a DOI were not accepted. The literature was compiled using PubMed, ScienceDirect, and SagePub, among other online venues.*

Result: *Our research team initially collected numerous publications from credible sources such as Science Direct, PubMed, and JAMA Dermatology. Employing a meticulous three-tier screening approach, we identified only five papers that were directly pertinent to our ongoing systematic assessment. Subsequently, we conducted a comprehensive examination of the entire text and further selected articles; case control study, double-blind, randomized, placebo-controlled study, randomized controlled trial, a bidirectional two-sample mendelian randomization analysis, and observational cross-sectional study.*

Conclusion: *In conclusion, maintaining serum vitamin D levels above 30 ng/ml may benefit severe psoriasis, while oral vitamin D2 supplementation showed promise in mild cases. Larger trials are needed for severe psoriasis, and future research should explore higher doses. Additionally, a study found no support for monthly vitamin D3 supplementation in older mild psoriasis patients. We confirmed the causal link between vitamin D levels and psoriasis, identified associations with increased risk, and explored effects on atopic dermatitis. While no significant difference was found in serum vitamin D levels between psoriasis patients and controls, lower levels in psoriasis suggest various influences.*

Keyword: *Psoriasis, vitamin D supplementation*

INTRODUCTION

Recent insights into psoriasis have shifted our understanding from viewing it solely as a skin condition to recognizing it as a systemic ailment. This shift has prompted the investigation of novel targeted therapies for its management.¹ Population-based surveys indicate dissatisfaction with current treatments, significant impairment in quality of life, and heightened societal stigma surrounding psoriasis, underscoring its substantial burden. Globally, the prevalence of psoriasis ranges up to 11.4%, varying by region.²

Research indicates an inverse relationship between circulating levels of vitamin D3 and the progression of autoimmune disorders. Vitamin D deficiency is implicated in the pathophysiology of psoriasis, with the active form of vitamin D and its receptors playing a role in regulating keratinocytes.^{3,4} Various studies highlight vitamin D's impact on keratinocyte proliferation and differentiation, crucial for maintaining the balance of the cutaneous immune system and apoptosis. Genetic variations in vitamin D receptors contribute to vitamin D resistance in autoimmune diseases, necessitating higher doses for clinical efficacy. Toxicity is unlikely at serum concentrations of vitamin D3 below 300 ng/mL.³

Monitoring serum parathyroid hormone levels serves as a reliable indicator for determining optimal therapeutic doses of vitamin D3 for psoriasis treatment. Low vitamin D levels lead to elevated parathyroid hormone levels due to their interdependent feedback mechanism. While vitamin D3 therapy typically lowers parathyroid hormone levels, resistance at vitamin D receptors in autoimmune disorders may result in suboptimal reductions, requiring dose adjustments.^{5,6}

Optimal doses of vitamin D enhance both natural and adaptive immunity, presenting a promising alternative to immunosuppressive drugs in psoriasis management. However, there's a paucity of clinical studies on the use of high-dose oral vitamin D3 for psoriasis management.⁶ The purpose of this review is to critically evaluate existing evidence regarding the use of vitamin D supplementation in the management of psoriasis. This systematic review aims to assess the effectiveness of vitamin D supplementation in improving psoriasis symptoms, evaluate treatment outcomes such as disease severity, quality of life, and patient satisfaction, and investigate the safety profile of vitamin D supplementation in psoriasis patients. Through a thorough analysis of available literature, this review seeks to provide valuable insights for clinicians, researchers, and policymakers regarding the potential role of vitamin D supplementation as a therapeutic option for psoriasis management.

METHODS

Protocol

The researchers in this study followed the 2020 Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines to ensure that their work met the required standards. This was done to ensure the precision and reliability of the conclusions derived from the research.

Criteria for Eligibility

For inclusion in the study, published articles had to meet particular requirements. They had to be research papers written in English, focusing on Effectiveness, Outcome, and Safety of Vitamin D Supplementation in Patients with Psoriasis. The studies had to meet the following criteria: articles need to have been published after 2017 but within the applicable timeframe for this systematic review. Articles falling into categories like editorials, lacking a DOI, review articles that were already published, or duplicating previously published journal papers were excluded from the assessment.

Search Strategy

We conducted a comprehensive literature search using PubMed, JAMA Dermatology, and ScienceDirect focusing on studies published from 2017 to 2024. The search terms employed were as follows ("vitamin d"[MeSH Terms] OR "vitamin d"[All Fields] OR "ergocalciferols"[MeSH Terms] OR "ergocalciferols"[All Fields]) AND ("psoriasis"[MeSH Terms] OR "psoriasis"[All Fields] OR "psoriasis"[All Fields] OR "psoriasis"[All Fields]). Moreover, we performed cross-referencing of relevant articles to reveal additional research. The evaluation of study quality, methodology, interventions, and results was undertaken independently by the researchers, resolving any differences through discussion and agreement. Furthermore, both researchers collected and compared discoveries from all studies, considering the potential for conducting a meta-analysis if deemed feasible.

Inclusion and exclusion criteria

Inclusion criteria for the studies were as follows: (1) original research that assesses Effectiveness, Outcome, and Safety of Vitamin D Supplementation in Patients with Psoriasis; (2) Randomized Controlled Trials (RCTs) or observational studies (cohort or case-control studies); (3) availability of relevant data. Exclusion criteria were as follows: (1) ongoing studies without available data; (2) duplicate publications. In cases of duplicate publications, the most recent article was chosen; (3) Non-English language studies were excluded.

Data Retrieval

The authors conducted a thorough examination of relevant studies, specifically selecting those that met precise inclusion criteria. They focused on original, unpublished papers in English to ensure a refined and high-quality selection. The analysis covered essential information, such as study particulars, authors, publication dates, locations, and research methodologies, aligning with the study's objective

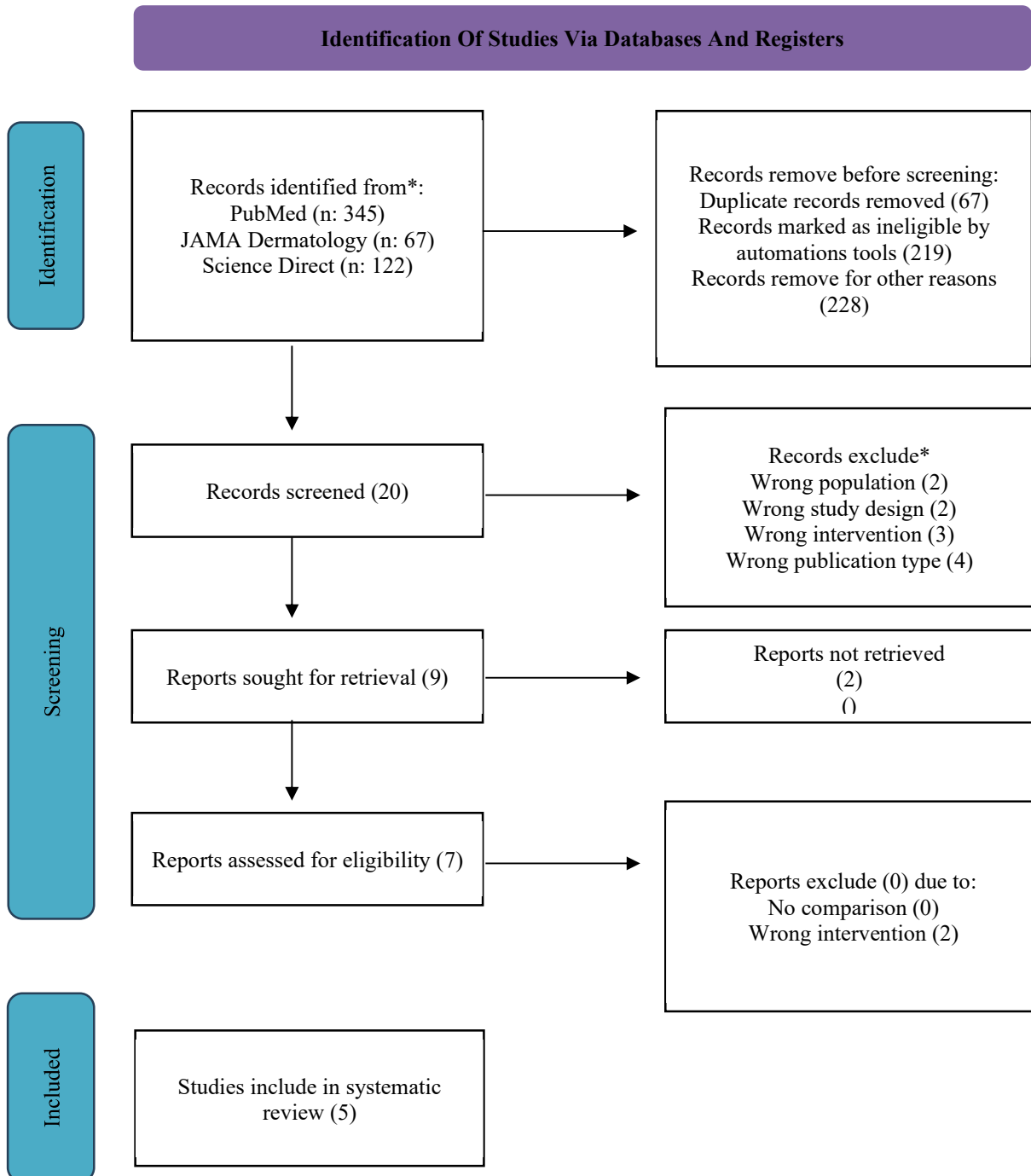


Figure 1. Research Flow Chart

TABLE 1. LIST OF ARTICLES INCLUDED IN STUDY

NN	AUTHOR	Origin	Method	Sample Size	Research in Medical and Health Science	ISSN: 2208-2425
	Bhat et al., 2022. ⁷	India	Case control study.	A total of 285 Psoriasis patients were taken for the study.	Six hundred two (n = 602) subjects (285 cases and 317 controls) were taken for the study. Cases and controls were frequency matched with respect to age and gender. Various demographic and clinical details were taken using a questionnaire. Chemiluminescence Micro Particle Immunoassay was used to estimate serum 25-hydroxy vitamin D levels. The vitamin D deficiency in psoriasis patients was 60.0% vs. 17.5% in controls (P < 0.001) with mean vitamin D levels of 28.3 ± 13.9 ng/ml in psoriasis patient's vs. 37.9 ± 9.7 ng/ml in controls.	
	Disphanurat et al., 2019. ⁸	Thailand	Double-blind, randomized, placebo-controlled study.	45 were eligible and randomized to the oral vitamin D2 group (n=23) or placebo group (n=22).	At enrollment, the mean PASI score was 4.45, and 26.7% of patients had vitamin D deficiency. At 3 months, the oral vitamin D2 group had significantly higher PASI improvement than the placebo group (mean PASI improvement: 1.43 versus [vs.] -0.33, p-value=0.034; mean %PASI improvement: 34.21% vs. -1.85%, p-value=0.039). The mean serum 25(OH)D level was significantly higher in the oral vitamin D group than in the placebo group (27.4 vs. 22.4 ng/mL, p-value=0.029). Serum 25(OH)D concentrations were significantly inversely correlated with PASI scores at the 6-month follow-up. No major adverse event was observed overall.	
	Paul et al., 2017. ⁹	US	Randomized controlled trial.	A sample size of 50 participants with psoriasis was pre-determined to detect a medium effect size of 0.5 in the PASI score with alpha 0.05 and 80% power. A	Twenty three were allocated to vitamin D and 42 to placebo. There was no significant difference at baseline between the two groups. Mean (SD) baseline 25-hydroxyvitamin D was 65.7 (25.7) nmol/L. There were no significant differences (p>0.05) between the groups in all of the psoriasis outcome measures. Mean scores [95% CI] at 12 months for the Placebo vs. Vitamin D groups: PASI 2.2 [1.4, 3.0] vs 2.1 [1.0, 3.2]; PGA 1.4 [1.1, 1.7] vs 1.5 [1.1, 1.9]; PDI 2.1 [0.9, 3.2] vs 1.9 [0.4, 3.4]; and DLQI 2.5 [1.4, 3.6] vs 2.0 [0.5, 3.4].	
	Ren et al. 2022. ¹⁰	US	A bidirectional two-sample mendelian randomization analysis.	Three measures of circulating vitamin D levels (25(OH)D in 120,618 individuals, and 25(OH)D3 and epimeric form C3-epi-25(OH)D3 in 40,562 individuals) and for the diseases psoriasis (3871 cases and 333,288 controls), atopic dermatitis (21,399 cases and 95,464 controls), and vitiligo (4680 cases and 39,586 controls).	We showed that elevated vitamin D levels protected individuals from developing psoriasis (OR = 0.995, p = 8.84 × 10 ⁻⁴ for 25(OH)D; OR = 0.997, p = 1.81 × 10 ⁻³ for 25(OH)D3; and OR = 0.998, p = 0.044 for C3-epi-25(OH)D3). Genetically predicted risk of atopic dermatitis increased the levels of 25(OH)D (OR = 1.040, p = 7.14 × 10 ⁻⁴) and 25(OH)D3 (OR = 1.208, p = 0.048). A sensitivity analysis suggested the robustness of these causal associations.	

Fernandes et al., 2020. ¹¹	Indonesia	Observational cross-sectional study.	This study involved 32 research subjects who have met the criteria of acceptance and rejection	The mean serum vitamin D in psoriasis vulgaris patients and controls were 14.36 ± 6.36 and 19.92 ± 7.59 ng/mL, respectively. No psoriasis vulgaris were observed in patients with normal 25(OH)D levels, and only 3 control subjects with normal serum 25(OH)D levels. These results were not statistically significant ($p = 0.09$).
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RESULT

Our research team initially collected numerous publications from credible sources such as Science Direct, PubMed, and JAMA Dermatology. Employing a meticulous three-tier screening approach, we identified only five papers that were directly pertinent to our ongoing systematic assessment. Subsequently, we conducted a comprehensive examination of the entire text and further selected articles; case control study, double-blind, randomized, placebo-controlled study, randomized controlled trial, a bidirectional two-sample mendelian randomization analysis, and observational cross-sectional study. Table 1 presents a compilation of the literature in this analysis, facilitating accessibility and comprehension.

This study focused on investigating the relationship between serum 25-hydroxy vitamin D levels and various sociodemographic and clinicopathological factors in patients diagnosed with psoriasis. A total of 285 psoriasis patients participated, with the majority being males (61.8%) and the mean age of patients being 44.6 years. Notably, over two-thirds of the patients were aged 40 or above. Additionally, the study found that most patients were non-smokers (73.0%), while a significant proportion reported alcohol abuse (31.9%).⁷

Controls were also included in the study, totaling 317 individuals, who were carefully matched with the patients in terms of age and gender. The control group consisted of 60.0% males, with a mean age of 43.6 years. This meticulous matching enabled a robust comparison between psoriasis patients and controls.⁷

Analysis of serum 25-hydroxy vitamin D levels revealed a striking difference between psoriasis patients and controls. Psoriasis patients exhibited significantly lower levels of vitamin D compared to the control group ($P < 0.001$). Even after adjusting for potential confounding factors such as age, gender, and smoking status, this discrepancy remained statistically significant ($P < 0.001$).⁷

Further examination of the association between vitamin D levels and psoriasis risk unveiled compelling findings. Notably, individuals with low vitamin D levels were at a significantly higher risk of developing psoriasis, particularly among smokers ($P < 0.0001$). Interestingly, even patients without a family history of psoriasis displayed a marked prevalence of low vitamin D levels ($P < 0.0001$).⁷

The study also identified several other factors associated with low vitamin D levels in psoriasis patients, including alcohol abuse, hypertension, chronic medication use, nail changes, and longer symptom duration ($P < 0.0001$). Moreover, disease severity was found to correlate with vitamin D levels, with severe cases exhibiting notably lower levels ($P = 0.004$).⁷

Abnormal vitamin D metabolism has been suggested to contribute to the development of psoriasis, yet limited data exist on the impact of vitamin D in Asian psoriasis patients. To address this gap, we conducted a study focusing on Thai patients to evaluate the efficacy of vitamin D against psoriasis and its influence on vitamin D metabolism. Out of fifty initially screened patients, five were excluded, resulting in 45 eligible participants who were randomized into either the vitamin D group (23 patients) or the placebo group (22 patients).⁸

There were no significant differences in mean age, BMI, medication use for psoriasis, or baseline serum 25(OH)D levels between the two groups. At enrollment, approximately one-fourth of patients had vitamin D deficiency, while over half had vitamin D insufficiency. Baseline PASI scores did not significantly differ between the groups.⁸

Regarding the efficacy of oral vitamin D on psoriasis, at the 3-month follow-up, the vitamin D group showed a significant improvement in PASI scores compared to the placebo group ($p=0.039$). This improvement persisted at the 6-month follow-up, although the difference between the two groups was not statistically significant. Notably, a higher proportion of patients in the vitamin D group achieved PASI50 and PASI75 compared to the placebo group.⁸

The study also found a significant inverse correlation between serum 25(OH)D levels and PASI scores at the 6-month follow-up ($r=-0.359$, $p=0.029$). Furthermore, the proportion of patients with vitamin D deficiency significantly decreased in the vitamin D group, while the placebo group saw a significant decrease in the number of patients with normal vitamin D levels.⁸

Regarding blood chemistry levels, there were no significant changes in parathyroid hormone, calcium, phosphorus, or CRP levels from baseline. Notably, no cases of hypercalcemia were reported throughout the study period. In terms of adverse

events, few were reported, with only minor complaints such as drowsiness and nausea, and no serious adverse events occurred during the study. Overall, oral vitamin D supplementation demonstrated efficacy in improving PASI scores and normalizing vitamin D levels in Thai psoriasis patients, with minimal adverse events reported.⁸

Oral vitamin D emerges as a promising, safe, and cost-effective treatment option for managing psoriasis. However, the clinical effects of vitamin D supplementation in psoriasis have yet to be thoroughly explored through randomized double-blind, placebo-controlled trials. Our study aimed to address this gap by recruiting patients between June 2011 and December 2012, with follow-up concluding in December 2013. Unblinding occurred after the main study concluded in late 2015. Sixty-five patients participated, with 23 assigned to the intervention group and 42 to the placebo group, deviating significantly ($p=0.02$) from the expected equal allocation.⁹

The mean age (SD) of the participants was 66.0 (8.0) years, with a mean baseline (SD) 25(OH)D level of 65.7 (26) nmol/L. Notably, participants exhibited mild psoriasis based on PASI and other measures.⁹

No significant differences were observed between the two groups across any measured parameters. Additionally, the interaction term tested in the model was not statistically significant, indicating consistency in the difference of psoriasis scores between vitamin D and placebo groups across visits.⁹

To investigate the potential causal relationship between circulating vitamin D levels and the risk of psoriasis, atopic dermatitis, and vitiligo, researchers conducted Mendelian randomization (MR) analyses. Researchers identified a set of instrumental variables (IVs) for each type of circulating vitamin D: 25(OH)D, 25(OH)D3, and C3-epi-25(OH)D3.¹⁰

IVW analysis revealed a significant causal effect of lower blood 25(OH)D levels on the risk of developing psoriasis. Specifically, a one standard deviation decrease in circulating 25(OH)D was associated with approximately a 5% increased risk of psoriasis (odds ratio (OR): 0.995, 95% confidence interval (CI): 0.991–0.998, $p = 8.84 \times 10^{-4}$). This causal effect was consistently observed across various MR analyses, including the weighted median and MR-PRESSO MR analyses. Similarly, researchers found significant causal effects of decreased circulating 25(OH)D3 and C3-epi-25(OH)D3 levels on increasing the risk of psoriasis.¹⁰

However, researchers did not find any significant evidence for causal effects of circulating vitamin D levels on atopic dermatitis or vitiligo. Additionally, to explore the possibility of a bidirectional relationship between diseases and vitamin D levels, researchers conducted reverse two-sample MR analysis. Interestingly, researchers found that the genetically predicted risk of atopic dermatitis was significantly associated with increasing levels of blood 25(OH)D. Moreover, MR-Egger methods detected a significant causal effect of atopic dermatitis on the levels of 25(OH)D3. However, neither the genetically predicted risk of psoriasis nor vitiligo influenced circulating vitamin D levels.¹⁰

These findings suggest a potential causal relationship between lower circulating vitamin D levels and an increased risk of psoriasis, with evidence indicating a bidirectional association between atopic dermatitis and vitamin D levels. However, no significant causal effects were observed between circulating vitamin D levels and vitiligo. Further research is warranted to elucidate the underlying mechanisms and clinical implications of these relationships.¹⁰

The promising findings from previous studies have motivated researchers to delve deeper into the subject matter at Dr. Soetomo General Hospital. This study aimed to investigate the disparities in serum vitamin D levels between patients with psoriasis vulgaris and control subjects, with potential implications for both academic understanding and practical management of psoriasis, including the potential use of vitamin D supplementation.¹¹

The study involved 32 research subjects who met the specified criteria for inclusion and exclusion. Sixteen patients were clinically and histopathologically diagnosed with psoriasis vulgaris, while sixteen control subjects were carefully selected based on matching criteria including age, sex, and indoor/outdoor occupation. The sampling technique utilized consecutive sampling.¹¹

The study included more male subjects, yet the sex distribution was homogeneous between the psoriasis vulgaris group and the control subjects. The mean age across both groups was 46.06 ± 12.00 years, with no significant difference observed between the psoriasis vulgaris and control groups. The majority of subjects had Fitzpatrick skin type IV, and there was no significant difference in skin type distribution between the two groups. Most subjects had a high school education level and resided in Surabaya. Additionally, the majority had indoor occupations and earned below the regional minimum wage. Assessment of sunlight protection revealed no significant difference between the psoriasis vulgaris and control groups.¹¹

Joint involvement was observed in over half of the patients, while nail involvement was present in a quarter of patients. Only a small percentage had a family history of psoriasis vulgaris. The severity of psoriasis was predominantly moderate to severe based on PASI scores. Systemic methotrexate therapy was commonly used among patients, along with topical corticosteroid therapy.¹¹

Regarding serum 25(OH)D levels, a high prevalence of deficiency was observed in both psoriasis patients (81.5%) and control subjects (68.75%). The Mann-Whitney U-test revealed a statistically insignificant difference in serum 25(OH)D levels between psoriasis vulgaris patients and control subjects ($p = 0.090$), although both groups exhibited a high prevalence of deficiency.¹¹

DISCUSSION

Psoriasis prevalence varies geographically, ranging from 0.1% in East Asia to 1.5% in Western Europe, potentially triggered by genetic, environmental, and random factors. While psoriasis occurrence is typically balanced between genders, study observed a higher prevalence among males, consistent with previous findings. Psoriasis onset commonly peaks between 15-20 years and 55-60 years, study showing most patients over 40 years old. Smoking, hypertension, and alcohol use were prevalent among psoriasis patients, aligning with known associations. Family history and nail changes were also notable, indicating genetic and phenotypic influences.¹²

Serum 25-hydroxy vitamin D (25(OH)D) levels were significantly lower in psoriasis patients compared to controls, particularly in severe cases, consistent with previous research. Female psoriasis patients showed significantly higher 25(OH)D levels, possibly influenced by factors like sun exposure. Age, smoking, and hypertension were associated with reduced 25(OH)D levels, potentially exacerbating psoriasis severity.³

Low 25(OH)D concentrations promote keratinocyte proliferation, while higher levels have inhibitory effects, modulating proinflammatory cytokine expression. Oral vitamin D supplementation may alleviate psoriasis-related comorbidities, although its efficacy remains debated, particularly in patients with normal 25(OH)D levels. Further research is needed to clarify the role of vitamin D in psoriasis treatment.⁷

A study, conducted on Thai patients with mild psoriasis, found significant improvement in PASI scores after 3 months of vitamin D supplementation, consistent with prior research. Although the improvement trended strongly at 6 months ($p=0.055$), the small sample size may have impacted statistical significance. Nonetheless, we observed a significant inverse correlation between serum 25(OH)D levels and PASI scores at the 6-month follow-up, suggesting a link between higher vitamin D levels and reduced psoriasis severity.⁸

Vitamin D is known for its role in bone health and immune regulation, with emerging evidence supporting its benefits in chronic inflammatory conditions like psoriasis. While previous studies have shown improvement in psoriasis with oral vitamin D supplementation, this is as a randomized, double-blind, placebo-controlled trial. Despite some conflicting results in recent RCTs, the association between PASI scores and 25(OH)D concentration remains significant.⁸

Psoriatic patients often exhibit lower serum 25(OH)D levels and a higher prevalence of vitamin D deficiency compared to healthy individuals. The study's findings suggest that psoriasis patients may be particularly at risk of vitamin D deficiency. Genetic factors, such as vitamin D-binding protein or receptor gene polymorphisms, may influence individual responses to vitamin D supplementation.⁸

Determining the optimal dosage for vitamin D supplementation remains an ongoing challenge, with various studies suggesting different doses. The chosen dosage of 60,000 IU every 2 weeks falls within recommended tolerable limits established by medical organization.⁸

In a randomized, double-blind, placebo-controlled trial involving patients with mild psoriasis, monthly supplementation of 100,000 IU vitamin D3 over 12 months did not result in a therapeutic effect, as assessed by the PASI score. Quality of life, measured by DLQI and PDI, also showed no significant between-group differences.⁹

The study recruited 65 participants from a community population, representing approximately 1.3% of the subjects from the ViDA pool. This community-based approach likely reflects the true prevalence of psoriasis within the population. Although 25-hydroxyvitamin D levels were not measured during the trial due to financial constraints, it is estimated that participants in the vitamin D group achieved concentrations around 120 nmol/L based on data from other participants.⁹

Despite an unexpected imbalance in group numbers, the placebo and vitamin D groups were well-matched. Further research could explore the effects of vitamin D supplementation specifically in vitamin D-deficient psoriasis patients, as vitamin D deficiency has been linked to overproduction of IL-17, a key cytokine in psoriasis pathogenesis. Identifying psoriasis subgroups, particularly those affected by winter-related symptoms, may help determine the effectiveness of vitamin D supplementation in specific contexts.⁹

In a study, researcher conducted a bidirectional MR analysis to explore the causal relationships between circulating vitamin D levels and the risk of three common skin inflammatory diseases: psoriasis, atopic dermatitis, and vitiligo.¹⁰

Findings revealed a significant causal effect of elevated blood vitamin D levels in reducing the risk of psoriasis, while suggesting that the incidence of atopic dermatitis might elevate blood vitamin D levels. These results underscore the potential of blood vitamin D levels as targets for disease intervention and monitoring.¹¹

Previous epidemiological studies have indicated lower serum vitamin D levels in psoriasis patients compared to healthy controls. Supplementation with vitamin D has been associated with reduced mortality and effective treatment of psoriasis. This study validated the causal effect of vitamin D on the risk of psoriasis using MR analysis, providing evidence from a different genetic dataset. Additionally, we identified that low levels of circulating 25(OH)D3 and C3-epi-25(OH)D3 increase the risk of psoriasis, highlighting their potential causal effects for the first time.¹⁴

Vitamin D receptors are widely distributed in immune cells, suggesting its role in modulating immune responses. In psoriasis, abnormal vitamin D metabolism may activate T cells and regulate cytokine secretion. Supplementation with vitamin D has been shown to reduce systemic inflammation in psoriatic patients by decreasing levels of pro-inflammatory cytokines.¹³

Regarding atopic dermatitis, the study achieved consistent results with previous MR analyses, indicating no causal effect of blood vitamin D levels on the risk of atopic dermatitis. However, we found that developing atopic dermatitis may elevate blood vitamin D levels, contrary to previous epidemiological reports associating atopic dermatitis with vitamin D deficiency. This suggests that disease biological pathways may influence blood vitamin D levels in atopic dermatitis, offering insights into disease etiology and complications.¹⁰

The control group was carefully selected to match the age, sex, and occupation distribution of the psoriasis vulgaris patients. Each group comprised 9 males (56.25%) and 7 females (43.75%). The average age of the psoriasis vulgaris group was 46.18 ± 12.36 years, while in the control group, it was 45.93 ± 12.03 years. Approximately 37.5% of psoriasis vulgaris patients had an illness duration of 5 – 10 years, with an average PASI score of 11.79 ± 6.17 . Family history of psoriasis vulgaris was present in only 12.5% of patients.¹¹

Several studies from different countries have reported varying findings regarding psoriasis vulgaris characteristics and treatment. In Korea, Han et al. (2017) observed an increase in psoriasis prevalence after age 50, with a male predominance of 56%.¹⁶ In Japan, Ito et al. (2017) found 67.6% male patients among 9,290 cases of psoriasis, with complications such as joint symptoms (13.6%) and nail involvement (25.7%).¹⁷ Treatment modalities varied between countries, with cyclosporine being the most used agent in Japan (33.6%) and topical corticosteroids being prevalent in Taiwan (98.4%).¹¹

Regarding serum 25(OH)D levels, psoriasis vulgaris patients exhibited lower levels compared to controls in Italy (Filoni et al., 2018), with a mean value of 21.8 ng/mL vs. 34.3 ng/mL, respectively.¹⁸ However, a study in Iran by Maleki et al. (2016) found no significant difference in vitamin D levels between psoriasis patients and controls ($p = 0.21$).¹⁹ Factors influencing serum vitamin D levels include outdoor activities, occupation, and geographical location. In Indonesia, where Surabaya residents benefit from year-round UV exposure, studies have shown conflicting results regarding serum vitamin D levels in psoriasis patients compared to controls.¹¹

Supplementation with vitamin D, particularly vitamin D3, is recommended for populations at risk of deficiency, such as psoriasis patients. Daily intake of 1000 IU vitamin D3 is suggested to increase serum levels by 10-20 ng/mL, with doses up to 10,000 IU daily considered safe. However, there's still insufficient evidence to support extraskeletal effects of vitamin D, and recommendations are primarily based on its role in bone health.¹¹

CONCLUSION

In conclusion, study and existing evidence highlight the prevalence of 25-hydroxy vitamin D deficiency in severe psoriasis, suggesting that maintaining serum levels above 30 ng/ml could positively impact disease progression. While trial demonstrated the efficacy of oral vitamin D2 supplementation in improving mild psoriasis, increasing serum 25(OH)D concentrations, and reducing vitamin D deficiency rates, larger randomized controlled trials are needed to assess its effectiveness in more severe cases. Future research should explore higher doses and longer durations of vitamin D2 supplementation for moderately severe and severe psoriasis. One study the first of its kind in a community-dwelling population, does not support monthly vitamin D3 supplementation (100,000 IU per month) as a treatment for mild psoriasis in patients over 50 years of age. Furthermore, we confirmed the causal relationship between 25(OH)D levels and psoriasis, while identifying causal associations of lower 25(OH)D3 and C3-epi-25(OH)D3 levels with increased psoriasis risk and the effects of increased 25(OH)D3 levels on atopic dermatitis for the first time. Despite no significant difference found between serum 25(OH)D levels in psoriasis vulgaris patients and the control group, the lower levels observed in the psoriasis group suggest potential influences from various factors like age, skin type, sun exposure duration, outdoor activities, and sun protection measures.

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