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A Cross Sectional Study of Serum vitamin D Levels in patients of Psoriasis

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Abstract:

Background: Psoriasis is a chronic, immune-mediated skin disorder influenced by environmental and metabolic factors, including vitamin D status. Vitamin D plays a key role in immune regulation and keratinocyte proliferation, both central to psoriasis pathogenesis. Objective: To evaluate serum vitamin D levels in psoriasis patients and assess their association with disease severity. Methods: A cross-sectional study was conducted on 100 clinically diagnosed psoriasis patients. Demographic details, clinical characteristics, and sun exposure patterns were recorded. Serum 25(OH) vitamin D levels were measured and psoriasis severity was assessed using the Psoriasis Area and Severity Index (PASI). Statistical analysis included correlation and ANOVA to evaluate associations between vitamin D levels and PASI scores. Results: The study population consisted of 59% males and 41% females, with the majority (34%) aged between 31–45 years. Plaque psoriasis was the most common type (68%), and 48% had the disease for 1–5 years. Vitamin D levels were insufficient in 51%, sufficient in 39%, and deficient in 10% of patients. A statistically significant inverse correlation was observed between vitamin D levels and psoriasis severity ($r = -0.68$, $p < 0.001$). Patients with mild psoriasis had the highest mean vitamin D levels (33.84 ng/mL), while those with severe psoriasis had the lowest (14.48 ng/mL). Conclusion: Vitamin D insufficiency is common among psoriasis patients and is significantly associated with greater disease severity. Routine screening and correction of vitamin D levels may benefit the overall management of psoriasis.

Keywords:
Psoriasis, Vitamin D, PASI Score, Serum 25(OH)D, Disease Severity, Sun Exposure.

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Introduction

Psoriasis is a chronic, immune-mediated, inflammatory skin disorder characterized by hyperproliferation and abnormal differentiation of keratinocytes, affecting approximately 2–3% of the global population [1]. Its multifactorial pathogenesis involves genetic, immunologic, and environmental components, with T-helper 1 (Th1) and T-helper 17 (Th17) cell pathways playing a critical role in disease progression [2].

Vitamin D, a secosteroid hormone, plays a crucial role not only in calcium homeostasis and bone metabolism but also in modulating immune responses. It has been observed to influence both innate and adaptive immunity, potentially downregulating pro-inflammatory cytokines implicated in psoriasis, such as interleukin-17 (IL-17) and tumor necrosis factor-alpha (TNF-α) [3,4]. Keratinocytes possess vitamin D receptors (VDR), and topical vitamin D analogs like calcipotriol have shown therapeutic efficacy in psoriasis, further supporting the role of vitamin D in its pathogenesis [5].

Several studies have reported a high prevalence of hypovitaminosis D among patients with psoriasis,

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suggesting an inverse correlation between serum vitamin D levels and disease severity [6,7]. However, results remain inconsistent across different populations and geographical locations, warranting region-specific data.

Therefore, this study aims to assess serum vitamin D levels in patients with psoriasis in a defined population and explore potential correlations with clinical variables, contributing to the growing understanding of the role of vitamin D in psoriatic disease.

Materials and Method

This was a hospital-based cross-sectional study conducted in the Department of Dermatology at Ashwini Rural Medical college, Hospital and Research Centre, a tertiary care centre in Solapur, Maharashtra.
The study included patients aged ≥18 years, clinically diagnosed with psoriasis (all types) by a qualified dermatologist, irrespective of disease duration. Patients who had received vitamin D supplementation or systemic therapy (e.g., methotrexate, cyclosporine, biologics) in the last three months were excluded. Patients with chronic renal or hepatic disease, malabsorption syndromes, or other autoimmune conditions were also excluded.

A sample size of 100 was determined using prevalence data from prior studies, assuming a prevalence of vitamin D deficiency in psoriasis patients of 63%, with 95% confidence level and 10% margin of error[8].
Convenience sampling was used to recruit eligible patients who attended the dermatology outpatient department during the study period and gave informed consent.

Method

After obtaining ethical clearance from the Institutional Ethics Committee, informed written consent was obtained from all participants. A structured proforma was used to collect the following data:

- **Demographic details**: Age, gender, residence, occupation, and sun exposure.
- **Clinical characteristics**: Type of psoriasis, duration of disease, family history, presence of joint involvement, and comorbidities.
- **Psoriasis Severity Assessment**: The severity of psoriasis was assessed using the Psoriasis Area and Severity Index (PASI).

Laboratory Investigations
Venous blood samples (5 mL) were collected under aseptic conditions and serum was separated. Serum 25-hydroxyvitamin D [25(OH)D] levels were measured using chemiluminescent immunoassay (CLIA). Levels were categorized as:

- **Deficient:** <20 ng/mL
- **Insufficient:** 20–29 ng/mL
- **Sufficient:** ≥30 ng/mL

Statistical Analysis
Data were entered into Microsoft Excel and analyzed using SPSS version 25. Quantitative variables were expressed as mean ± standard deviation (SD) and compared using the independent t-test or ANOVA. Categorical variables were expressed as frequencies and percentages and analyzed using the chi-square test. Pearson correlation was used to evaluate the relationship between serum vitamin D levels and PASI scores. A p-value <0.05 was considered statistically significant.

Observation and Results

Table 1 : Distribution of Demographic profile among study population

Parameters	Frequency	Percentages
Age		
18–30 Years	**29**	**29**
31–45 Years	**34**	**34**

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46–60 Years	**24**	**24**
>60 Years	**13**	**13**
Gender		
Male	**59**	**59**
Female	**41**	**41**
Residence		
Urban	**49**	**49**
Rural	**51**	**51**
Occupation		
Indoor	**39**	**39**
Outdoor	**43**	**43**
Mixed	**18**	**18**
Sun Exposure		
<30 min/day	**48**	**48**
30–60 min/day	**27**	**27**
>60 min/day	**25**	**25**

This presents the demographic profile of the study population. Among the participants, the largest age group was 31–45 years, comprising 34% of the population, followed by 18–30 years (29%), 46–60 years (24%), and those above 60 years (13%). The gender distribution showed a higher prevalence of males (59%) compared to females (41%). The residential background was almost evenly split, with 49% from urban and 51% from rural areas. In terms of occupation, 39% of the subjects were involved in indoor jobs, 43% in outdoor occupations, and 18% had mixed job profiles. Sun exposure varied among individuals; 48% were exposed to sunlight for less than 30 minutes daily, 27% for 30–60 minutes, and 25% for more than 60 minutes, indicating a majority with limited sun exposure.

Table 2 : Distribution of Clinical Characteristics among study population

Parameters	Frequency	Percentages
Type of Psoriasis		
Plaque	**68**	**68**
Guttate	**13**	**13**
Pustular	**13**	**13**
Erythrodemic	**6**	**6**
Duration of Disease		
<1 year	**25**	**25**
1–5 years	**48**	**48**
6–10 years	**17**	**17**
>10 years	**10**	**10**

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Family History		
Yes	**25**	**25**
No	**75**	**75**
Joint Involvement		
Yes	**26**	**26**
No	**74**	**74**
Comorbidities		
Present	**38**	**38**
Absent	**62**	**62**

Table 2 details the clinical characteristics of the study participants. The most common type of psoriasis was plaque psoriasis, observed in 68% of the population, while guttate and pustular types each affected 13%, and erythrodermic psoriasis was present in 6%. Regarding disease duration, nearly half of the patients (48%) had been suffering for 1–5 years. Shorter duration (<1 year) was seen in 25%, while 17% had the disease for 6–10 years, and 10% had it for more than 10 years. Only a quarter (25%) of the patients reported a family history of psoriasis. Joint involvement, often associated with psoriatic arthritis, was found in 26% of the patients. Furthermore, 38% had comorbid conditions such as diabetes or hypertension, while the remaining 62% did not report any comorbidities.

Figure 1 visually represents the distribution of psoriasis severity among the study population based on the PASI (Psoriasis Area and Severity Index) score. Although the figure itself is not visible, it is likely a bar or pie chart that categorizes patients into mild, moderate, and severe groups. Based on Table 4 data, out of 100 patients, the majority fall under the moderate category (60%), followed by mild (35%), and a small percentage in the severe category (5%). This suggests that while psoriasis severity varies, moderate cases are the most common among this population.

Figure 1 : Distribution of severity of psoriasis among study population

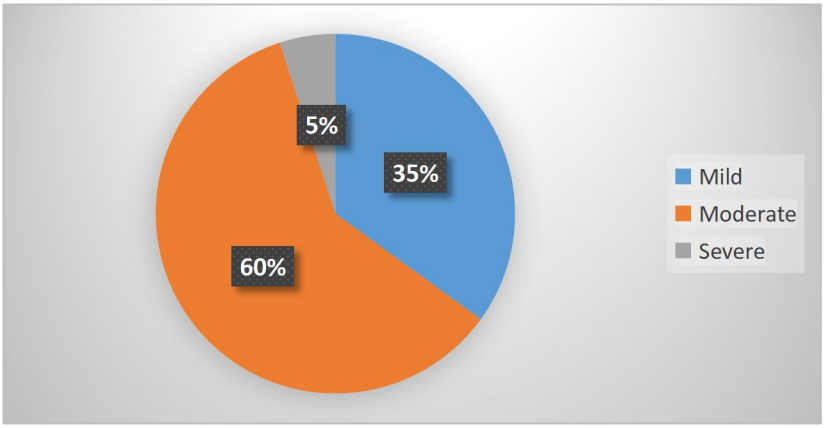

Table 3 : Distribution of overall Vitamin D level among study population

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Vitamin D Level	Frequency	Percentages
Insufficient	51	51
Sufficient	39	39
Deficient	10	10

Table 3 describes the distribution of Vitamin D levels among the study group. A significant portion of the participants (51%) had insufficient Vitamin D levels, while 39% had sufficient levels. Only 10% were found to be Vitamin D deficient, suggesting that although outright deficiency was less common, suboptimal levels were widespread.

Table 4 : Distribution of overall Vitamin D level among study population

PASI Severity	Count	Mean Vitamin D (ng/mL)	Standard Deviation	Min	Max	F-value	p-value
Mild	35	33.84	5.31	20.85	43.29	39.04	<0.001
Moderate	60	26.13	5.52	13.11	39.74		
Severe	5	14.48	5.36	9.58	22.57		

Table 4 examines the association between Vitamin D levels and the severity of psoriasis, as measured by the Psoriasis Area and Severity Index (PASI). Patients with mild psoriasis (35 individuals) had the highest mean Vitamin D levels (33.84 ng/mL), with relatively low variability (SD 5.31). In contrast, those with moderate psoriasis (60 individuals) had a mean Vitamin D level of 26.13 ng/mL, and those with severe psoriasis (5 individuals) had significantly lower levels, averaging 14.48 ng/mL. The F-value of 39.04 and a p-value of <0.001 indicate that the difference in Vitamin D levels across the severity groups was statistically significant. This demonstrates a clear inverse relationship—greater severity of psoriasis is associated with lower Vitamin D levels.

Figure 2 : Correlation between PASI score and Vitamin D level

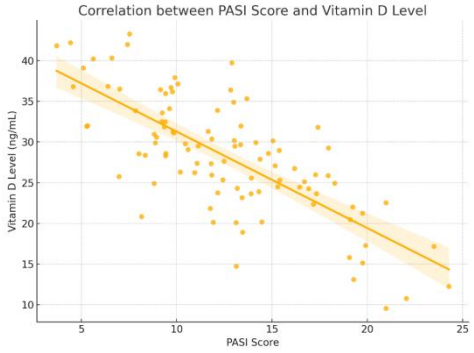

Figure 2 likely displays a scatter plot or similar visual representation showing the relationship between PASI score (psoriasis severity) and Vitamin D levels. The pattern described suggests an inverse correlation, where higher PASI scores (more severe psoriasis) are associated with lower Vitamin D levels. Correlation coefficient between

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variables was r = -0.68, p-value <0.00, indicating a moderate to strong inverse relationship.

Discussion

This study investigated the demographic, clinical, and biochemical characteristics of psoriasis patients, with a focus on serum Vitamin D levels and their association with disease severity using the Psoriasis Area and Severity Index (PASI).

The study population was predominantly in the 31–45 age group (34%), with a male preponderance (59%). This aligns with prior epidemiological data showing a higher incidence of psoriasis in males and in individuals aged between 30 and 50 years, considered a peak onset age for plaque psoriasis [1].

The most common form observed was plaque psoriasis (68%), followed by guttate (13%), pustular (13%), and erythrodermic psoriasis (6%). This distribution is consistent with previous studies which report plaque psoriasis as the most prevalent subtype, comprising 70–80% of all cases [9].

Nearly half (48%) of the participants had been suffering from psoriasis for 1–5 years, and 25% had joint involvement, possibly indicating early or established psoriatic arthritis. Similar frequencies have been documented in Indian cohorts where psoriatic arthritis prevalence ranged from 20–30% among psoriasis patients [10].

Our study revealed that 51% of the patients had insufficient Vitamin D levels, 10% were deficient, and only 39% had sufficient levels. These findings support the hypothesis that suboptimal Vitamin D status is common among individuals with psoriasis. Similar observations were made by Orgaz-Molina et al., who reported Vitamin D insufficiency in over 60% of psoriasis patients [4].

The high prevalence of insufficient Vitamin D levels could be attributed to limited sun exposure, as 48% of patients in this study reported less than 30 minutes of daily exposure. This lifestyle-related risk factor is particularly significant in urban settings and indoor occupations, which were also prevalent in our study population.

A statistically significant inverse relationship was found between Vitamin D levels and psoriasis severity. Patients with mild psoriasis had a mean Vitamin D level of 33.84 ng/mL, which decreased to 26.13 ng/mL in moderate cases and further to 14.48 ng/mL in severe cases ($p < 0.001$). The correlation coefficient ($r = -0.68$) indicated a moderate to strong negative correlation.

These findings are corroborated by research conducted by Wilson et al., who reported lower serum 25(OH)D concentrations in patients with severe psoriasis compared to those with mild disease [6]. Similarly, Gisondi et al. demonstrated a significant inverse relationship between PASI scores and Vitamin D levels in Italian patients [7].

The role of Vitamin D in modulating immune responses and keratinocyte proliferation provides a plausible biological basis for its influence on disease activity. Vitamin D analogs are already employed in topical treatment of psoriasis, further validating the therapeutic relevance of Vitamin D in disease management [11].

A cross-sectional study by Reddy et al. in South India found that 78% of psoriasis patients had suboptimal Vitamin D levels and reported a similar inverse association between PASI and serum Vitamin D ($r = -0.59$) [12]. Our study not only confirms this trend but also adds statistical strength to the association with an even stronger correlation coefficient.

Furthermore, Singh et al. documented that patients with psoriatic arthritis had significantly lower Vitamin D levels than those without joint involvement, although our study did not stratify Vitamin D levels based on joint involvement [13].

Conclusion

This study highlights a high prevalence of Vitamin D insufficiency among psoriasis patients, with a significant inverse correlation between serum Vitamin D levels and disease severity. Most patients had moderate psoriasis and limited sun exposure, which may contribute to suboptimal Vitamin D status. These findings suggest that assessing and correcting Vitamin D levels could play a supportive role in the comprehensive management of psoriasis.

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