

## A Comparative Study of Vitamin D Deficiency and Psoriasis at JLNCH, Bhagalpur, Bihar

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Received: 20-07-2022 / Revised: 19-08-2022 / Accepted: 06-09-2022

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Conflict of interest: Nil

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### Abstract

**Background:** An inflammatory condition that affects the skin and joints is psoriasis. Occasionally, hypocalcemia and vitamin D insufficiency affect psoriatic individuals. Our study's objective was to assess the calcium and vitamin D levels in psoriasis patients.

**Materials and Methods:** 110 psoriasis cases and 110 non-psoriatic patients (controls) were included in a comparative study between January 2022 and June 2022 at the outpatient department of JLNCH in Bhagalpur, Bihar. Both groups' serum concentrations of 25-hydroxyvitamin D3 [(25OH) D3], calcium, phosphorus, parathyroid hormone (PTH), alkaline phosphatase (ALK), and other substances were assessed. Utilizing version 19 of SPSS software, data were examined. For statistical analysis, the chi square test and T-test were performed.

**Results:** Among 110 psoriasis patients, 74 (67.3%) men and 36 (32.75%) women were affected. The serum levels of calcium (P-value: 0.563), phosphorus (P-value: 0.381), PTH (P-value: 0.364), and ALK (P-value: 0.639) did not significantly differ between the two groups. 64.5% of psoriatic patients and 60% of controls had vitamin D deficiency (P-value = 0.45); however, 30.9% of psoriatic patients and 17.3% of controls had severe hypovitaminosis D. The statistical significance of this difference was 0.014 (P value).

**Conclusion:** We found a substantial link between psoriasis and severe hypovitaminosis D. This result demonstrated the necessity of testing psoriatic patients for vitamin D insufficiency.

**Keywords:** Psoriasis, Vitamin D, Calcium, Parathyroid hormone

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### Introduction

The benefits of vitamin D for the cardiovascular system, immunological system, skeletal system, and diabetes are well known [1]. Investigations were conducted into the role of vitamin D in improving barrier function, immunological modulation, and the production of antimicrobial peptides including cathelicidin

and defensins [2,3]. According to earlier research, vitamin D plays a significant role in the development and treatment of skin conditions such psoriasis, atopic dermatitis, and skin cancer [1]. Vitamin D prevents aberrant keratinocyte proliferation and maturation, but it also has an immunomodulatory effect on the type 1

helper T cell pathway, which is crucial for the pathogenesis of psoriasis [4].

A skin and occasionally joint inflammatory condition called psoriasis is caused by an overactive innate immune system [5,6]. Patients with autoimmune disorders and those with psoriatic disease have both been found to have vitamin D deficiencies [7-9]. Local vitamin D analogues have been a cornerstone of treatment for mild to moderate psoriasis for years [10].

The improvement of adalimumab-induced psoriasis in a lady with rheumatoid arthritis and vitamin D deficiency after beginning high doses of vitamin D shows the potential significance of vitamin D in the development and therapy of psoriasis [11]. The treatment of psoriasis and psoriatic arthropathy with oral vitamin D is effective, according to a review of the literature [12]. Our study objective was to assess the vitamin D levels of psoriasis patients and compare them to the general population.

### Materials and Methods

After obtaining informed consent, 110 psoriasis patients from the Jawaharlal Nehru Medical College and Hospital in Bhagalpur, Bihar, who visited the OPD as outpatients from January 2022 to June 2022, as well as 110 healthy control subjects from the cases' peers, were included in this comparative study. Two groups that were being researched were matched into groups.

Age  $\geq 18$  and a dermatologist's clinical diagnosis of psoriasis were requirements for inclusion. All patients meeting the inclusion criteria were included in the survey-based sample approach. Patients who had received systemic steroids or a calcium and vitamin D supplement in the prior three months were not included in our study.

Age, sex, length of illness, psoriasis severity, presence or absence of arthritis, and past treatments were all collected from

patients. Body surface area (BSA) was used to categorise psoriasis severity as mild (2% BSA), moderate (3-10%), and severe (>10% BSA) [13]. One dermatologist calculated the degree of psoriasis. All subjects' BMIs were also calculated.

For the analysis of calcium, phosphorus, Alkaline phosphatase, parathyroid hormone (PTH), and 25-hydroxy vitamin D3 [(25 OH) D3], blood samples were taken. Utilizing version 19 of SPSS software, data were examined. For statistical analysis, the chi square test and T-test were performed. Statistical significance was defined as a P-value <0.05.

### Results

110 psoriasis sufferers and 110 matching control participants made up our study. Men made up 74 (67.3%) and women made up 36 (32.75%) of the psoriatic patients. In the control group, 35 (31.8%) women and 75 (68.2%) males participated. The average age of psoriasis patients was 39.01 ( $\pm 14.8$ ) years, compared to 39.00 ( $\pm 14.25$ ) for controls. Age and gender did not significantly differ between the two groups.

Psoriasis lasted an average of 110 months from 2 months to a maximum of 45 years. The BSA found that 3.6% of patients had severe involvement, 38.2% of patients had moderate involvement, and 58.2% of patients had mild psoriasis.

There was not a meaningful association between severity of psoriasis and vitamin D deficiency ( $P$ -value= 0.862). 3.6% of the patients and 2.7% of the controls both had hypocalcemia ( $Ca < 8.6$  mg/dl). According to statistics, this difference was not significant ( $P$ -value= 0.366).

The control group had a higher prevalence of hypercalcemia. ( $Ca > 10.3$  mg/dl) (2.7% vs 0.9), but the difference was not statistically significant ( $P$ -value= 0.563). (Table 1).

**Table 1: Biochemical characteristics of patients and control**

Variable	Psoriatic patients	Controls	p-value
Calcium mg/dl	9.29	9.45	0.563
Phosphorus mg/dl	3.35	3.49	0.381
ALK IU/L	210.38	205.02	0.639
PTH pg.dl	37.7	31.9	0.364
25 (OH) D ng/ml	17.77	18.59	0.487

ALK: Alkaline phosphatase; PTH: Parathyroid hormone; 25(OH)D: 25 hydroxy vitamin D

Vitamin D deficiency (vitamin D < 20 ng/dl) was present in 60% of the controls but was present in 64.5% of psoriasis patients (P-value = 0.45). The findings revealed that severe vitamin D hypovitaminosis (vit D < 8 ng/dl) was present in 30.9% of psoriasis patients and 17.3% of the control group. This difference was statistically significant (P-value=0.014). Male psoriasis patients' mean blood levels of 25 [OH D3] were 18.08 ( $\pm$ 12.86) ng/dl and female patients' mean levels were 17.81 ( $\pm$ 17.13) ng/dl (P-value = 0.751). The vitamin D level of the patients and the controls is shown in Table 2.

In psoriatic patients, the occurrence of vitamin D insufficiency was statistically unrelated to psoriatic arthritis, prior therapies, and BMI (P-value > 0.05).

**Table 2: Vitamin D levels of patients and control group**

Variable	Patients with psoriasis	Controls
Vitamin D < 8 ng/dl, mean	19(17.3%)	34(30.9%)
Vitamin D 8-20 ng/dl, mean	47(42.7%)	37(33.6%)
Vitamin D > 20 ng/dl, mean	44(40%)	39(35.5%)
Total	110(100%)	110(100%)

P-value: 0.014

## Discussion

Vitamin D is a crucial hormone that has historically been linked to calcium balance and bone metabolism. Previous studies revealed a link between a lack of vitamin D and an increased risk of certain malignancies, cardiovascular illness, and autoimmune diseases [14,15].

Although we were unable to confirm a link between vitamin D shortage (vitamin D 20 ng/dl) and psoriasis, we did discover that patients with psoriasis are more likely to have severe vitamin D deficiency. Age, gender, psoriatic arthritis, prior therapies, BMI, and other factors were not related to this connection. A previous study by

Shakiba, *et al.* found that 21% of healthy young ladies had severe hypovitaminosis D and that 60% of them had vitamin D deficiency [16].

Similar findings were seen in our study, where severe hypovitaminosis was found in 30% of psoriatic patients compared to 17% of healthy individuals, and vitamin D deficiency was found in 64.5% of psoriasis patients and 60% of controls.

Numerous research have examined the connection between vitamin D deficiency and psoriasis, and the majority of them

found a strong link between the two conditions.

Gisondi *et al.* investigated the levels of vitamin D in 141 healthy controls and 145 psoriasis patients. Their findings revealed that patients with psoriasis had significantly higher rates of vitamin D3 deficiency (57.8% vs. 29.7%) [9]. Similar to this, Orgaz-Molina and his associates assessed the vitamin D3 levels in 46 psoriasis sufferers and 46 control participants. Compared to the control group, 54.4% of psoriatic patients had vitamin D insufficiency, as opposed to 22.6% [8].

Despite the fact that vitamin D3 is mostly synthesised in the skin after exposure to sunshine, vitamin D insufficiency and psoriasis have been linked in sun-rich nations. For instance, in Kuwait, Al Mutairi *et al.* examined the vitamin D3 levels of 100 psoriasis patients and an equivalent number of healthy controls. They discovered that serum levels of 25 [OH] vitamin D were below <50 nmol/L in 87% of psoriasis patients and 56% of the controls, however that vitamin D deficiency was only found in 12% of patients and 9% of healthy controls [17].

In a different study, Atwa *et al.* evaluated the vitamin D3 status of 43 patients with psoriasis and 40 healthy Saudi Arabian controls. They discovered that the serum vitamin D level in psoriatic patients is significantly lower than in controls [18]. While in our study, the mean levels of vitamin D3 in patients and the control group were 17.77 ng/ml and 18.59 ng/ml, respectively, the mean levels of 25 hydroxy vitamin D3 in psoriatic patients and healthy participants were 11.74 ng/ml and 24.55 ng/ml, respectively.

Only in a research by Qadim and his colleagues was the serum calcium level examined in 98 hospitalised psoriasis patients and 100 controls. The relationship

between vitamin D deficiency and psoriasis has not yet been assessed. They discovered that hypocalcemia affected 37.2% of psoriasis patients [19], however in our investigation, hypocalcemia was reported in 3.6% of patients and 2.7% of controls, which was not statistically significant.

Higher incidence of hypocalcemia among hospitalised psoriasis patients is expected given the higher prevalence of vitamin D deficiency in hospitalised patients [20] and the critical role that vitamin D plays in calcium absorption [21]. However, the above study did not measure the level of vitamin D.

Our findings are in line with a research done among psoriatic patients in the United States.

Wilson PB assessed the levels of 25-hydroxyvitamin D3 in 148 psoriasis patients.

There was no difference in the prevalence of vitamin D insufficiency between the control group and the psoriatic patients (22). BMI and 25 (OH) D were shown to be negatively correlated in this investigation, but we were unable to detect a connection between BMI and vitamin D3 insufficiency.

Zuchi MF *et al.* measured the serum levels of vitamin D in 20 psoriasis patients and 20 healthy controls, but they were unable to detect any differences between the two groups that were clinically relevant. Women with psoriasis in this study had lower vitamin D levels than men, which was a finding not seen in the control group [3]. We also looked at the connection between vitamin D levels and gender, but our analysis did not find that association to be statistically significant.

The main causes of Iran's high prevalence of vitamin D deficiency appear to be sun avoidance behaviours, a lack of vitamin D-enriched foods, and clothing customs [21,23].

## Conclusion

The high prevalence of vitamin D deficiency in the general population may be responsible for the lack of a significant correlation between vitamin D level and psoriasis in our study. However, screening for vitamin D insufficiency for psoriasis should be taken into consideration due to the severe vitamin D hypovitaminosis among psoriatic patients in our analysis.

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