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25-Hydroxyvitamin D Serum Levels in Patients with Chronic Plaque Psoriasis- An Cross-Sectional Observational study

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ABSTRACT
Background: Psoriasis is a chronic inflammatory skin condition characterized by red patches with white scales. Vitamin D plays a crucial role in the regulation of keratinocyte growth and differentiation, and its deficiency has been associated with psoriasis. This study aimed to evaluate the serum 25-hydroxyvitamin D levels in patients with psoriasis and its correlation with disease severity and duration.
Methods: This cross-sectional comparative study was conducted from April 2022 to December 2024 in the dermatology outpatient department of NMCH, Patna. A total of 20 patients with chronic plaque psoriasis and 20 age- and sex-matched healthy controls were recruited using a purposive sampling method. Participants underwent a thorough history, clinical examination, and serum 25-hydroxyvitamin D level assessment using chemiluminescence immunoassay. The Psoriatic Area and Severity Index (PASI) score was obtained for all psoriatic patients.
Results: The psoriatic group and control group had similar epidemiological characteristics with no significant differences in age, gender, time spent outdoors, smoking, alcohol consumption, skin type, and BMI. The psoriatic group had an average age of 40.92 years, 55% male, and a BMI of 24.72. The control group had an average age of 40.88 years, 55% male, and a BMI of 24.59. A significant reduction in serum 25-hydroxyvitamin D levels was observed in the psoriatic group compared to the control group.
Conclusion: This study demonstrated a notable reduction in serum 25-hydroxyvitamin D levels in patients with psoriasis, highlighting the importance of regular assessment and potential supplementation of vitamin D in these patients to improve clinical outcomes**.**

Keywords: *Psoriasis, Vitamin D, 25-Hydroxyvitamin D, Keratinocytes, Chronic Plaque Psoriasis, Serum Levels, PASI Score.*

INTRODUCTION
Psoriasis is a long-lasting inflammatory and excessive growth skin condition that occurs due to the complex interaction of the body's natural and acquired immune system. It is clinically characterised by well-defined red patches with white scales, mainly on the outer surfaces of the body and scalp. The condition tends to persist and recur over time.[1]The existence of vitamin D receptors in keratinocytes was initially confirmed through in vitro analysis of cultured keratinocytes in 1988. Subsequently, numerous in vitro and clinical studies have extensively documented the involvement of vitamin D in the proliferation and differentiation of keratinocytes.[2]Vitamin D suppresses the growth of keratinocytes and promotes their maturation. Therefore, the significant findings regarding the impact of vitamin D on keratinocytes have revealed the role of vitamin D in the development of psoriasis. Specifically, a deficiency in vitamin D leads to an increase in the growth of keratinocytes and inflammation of the skin.[3]In July 2018, a meta-analysis was conducted to evaluate the levels of serum 25-hydroxyvitamin D in adults diagnosed with psoriasis. Out of a total of 107 studies, only 10 studies were selected for quantitative meta-analysis. studies demonstrated a statistically significant correlation between low levels of 25(OH)D and psoriasis, whereas other studies were unable to reproduce similar results. The pooled mean difference in serum 25(OH)D level was -6.13ng/mL (95%

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confidence interval -10.93 to 1.32ng/mL, p=0.001). This indicates a significant relationship between hypovitaminosis and psoriasis. However, it is important to note that a causal relationship could not be definitively established. Furthermore, these studies were constrained by a small sample size and clinical and methodological heterogeneity among the study groups.[4]Additionally, among the case-control studies published from 2019 to 2021, only a few of them demonstrated a noteworthy correlation between levels of 25(OH)D and psoriasis (5-9). Conversely, the remaining Based on the literature review of clinical studies conducted so far, it is still uncertain whether there is a clear association between psoriasis and vitamin D.[10-14]
Hence, we conducted this study to assess the serum 25(OH) D level in psoriasis patients and its correlation with the severity and duration of the disease in a larger sample group. Additionally, we considered the confounding factors to accurately evaluate the final outcome in our region of eastern Nepal. Additionally, the results of this study could potentially support the suggestion of administering oral vitamin D supplements to enhance the overall outcome of individuals with psoriasis.

Materials and Methods

The current cross-sectional comparative study was conducted from April 2022 to December 2024. The study was conducted in the outpatient department of the dermatology NMCH,Patna.20 cases of chronic plaque psoriasis, aged between 18 and 65 years, were recruited in the study using a no probability purposive sampling method This group of patients consisted of individuals with psoriasis. The study excluded cases of chronic plaque psoriasis that were undergoing any form of treatment or vitamin D supplementation. Furthermore, patients who had co-existent chronic inflammatory disorders such as multiple sclerosis, inflammatory bowel disease, rheumatoid arthritis, insulin-dependent diabetes mellitus, l up The study also included forty age- and sex-matched healthy subjects, who formed the control group.

After obtaining informed consent, all suspected cases of chronic plaque psoriasis underwent a thorough history and clinical examination, which included anthropometric assessment. Diagnosis confirmation through histopathological examination was conducted as part of the routine procedure. The Psoriatic Area and Severity Index (PASI) score was acquired. Age and sex-matched controls were recruited from a pool of healthy volunteers. Both psoriatic cases and control patients were subjected to the study. For the evaluation of serum 25-hydroxyvitamin D levels, a chemiluminescence immunoassay is used. Vitamin D status was classified based on serum 25-hydroxyvitamin D levels as follows: deficient (<20 ng/ml), insufficient (20–29A self-designed proforma was utilised to gather all pertinent data.

Results

Table1: Epidemiological characteristics in between Psoriatic and ControlGroup

Variables	Psoriatic Group(n=20)	Control Group(n=20)	P-value
Age(years)	**40.92(±SD14.87)**	**40.88(±SD14.22)**	**.988**
Gender **• Male(n)** **• Female(n)**	 **11(55%)** **9(45%)**	 **11(55%)** **9(45%)**	**1000**
Time Spent Outdoors(hours/week)	**13.54(±SD8.27)**	**13.34(±SD7.85)**	**.912**
Smoking(pack years)	**.57(±SD1.60)**	**.50(±SD1.84)**	**.856**
Alcohol(grams/day)	**1.68(±SD4.21)**	**.82(±SD3.32)**	**.313**
Fit z pa trick Type **• III(n)** **• IV(n)**	 **8(40%)** **12(60%)**	 **9(45%)** **11(55%)**	**.180**
Body Mass Index	**24.72(±SD4.29)**	**24.59(±SD3.84)**	**.883**

A comparative analysis was conducted between a psoriatic group (n=20) and a control group (n=20) to assess various epidemiological characteristics. The average age of participants in the psoriatic group was 40.92 years (±14.87), closely matching the control group at 40.88 years (±14.22), with no significant difference (p=0.988). Gender distribution was identical in both groups, with 55% male and 45% female participants (p=1.000). The average time spent outdoors per week was also similar, with the psoriatic group spending 13.54 hours (±8.27) and the control group 13.34 hours (±7.85) (p=0.912). Smoking habits were comparable, with pack years averaging 0.57 (±1.60) in the psoriatic group and 0.50 (±1.84) in the control group (p=0.856). Alcohol consumption was slightly higher in the psoriatic group at 1.68 grams/day (±4.21) compared to 0.82 grams/day (±3.32) in the control group, though this difference was not statistically significant (p=0.313). Skin type distribution according to Fitzpatrick classification showed that 40% of the psoriatic group had type III skin and 60% had type IV, while the control group had 45% with type III and 55% with type IV (p=0.180). Lastly, the body mass index (BMI) was virtually identical between the groups, with the psoriatic group at 24.72 (±4.29) and the control group at 24.59 (±3.84) (p=0.883).

Table2: Body Mass Index distribution in Psoriatic Group

Group	**Frequency(n)**	**Percentage (%)**
Underweight(<18.5)	**01**	**05**
Normal(18.5-24.9)	**11**	**55**
Overweight(25-29.9)	**5**	**25.0**
Obese(≥30)	**03**	**15.0**
Total	**20**	**100**

The distribution of Body Mass Index (BMI) in the psoriatic group is detailed as follows: 1 participant (5%) was underweight with a BMI less than 18.5, 11 participants (55%) had a normal BMI ranging from 18.5 to 24.9, 5 participants (25%) were overweight with a BMI between 25 and 29.9, and 3 participants (15%) were classified as obese with a BMI of 30 or higher. In total, the psoriatic group consisted of 20 participants, accounting for 100% of the sample.

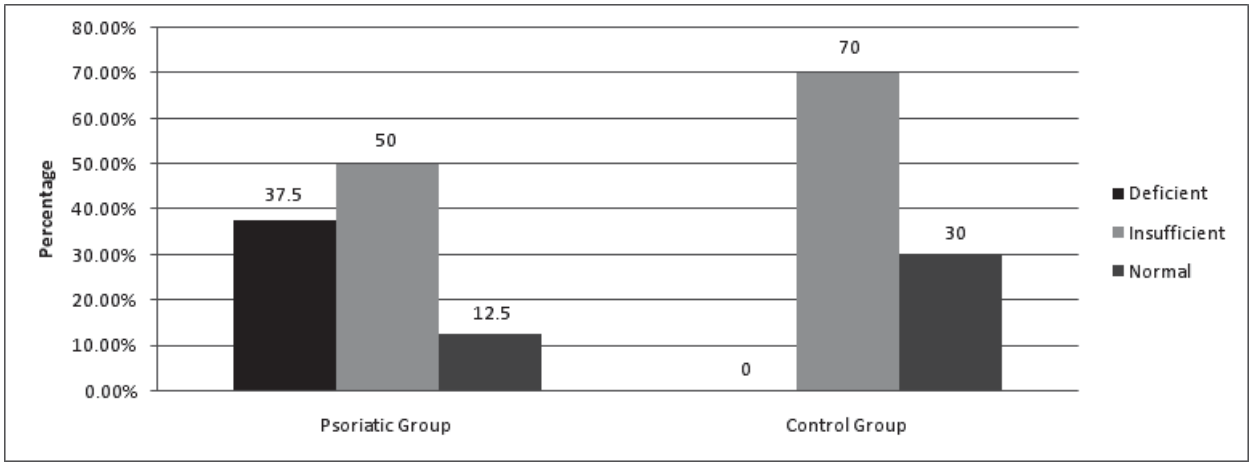

Figure 1: Serum 25-hydroxyvitamin D levels distribu on in Psoria c Group versus Control Group

Discussion

Vitamin D is a micronutrient that is soluble in fat. The most stable form of this micronutrient is 25-hydroxy vitamin D, which has a half-life of 2–3 weeks. Therefore, the measurement of 25-hydroxy vitamin D levels is commonly employed to determine an individual's vitamin D status. The documented effects of Vitamin D on calcium homeostasis include its endocrine effects. Additionally, Vitamin D has autocrine or paracrine effects on CYP27B1 (Cytochrome P450 Family 27 Subfamily B Member 1) and VDR (vitamin D receptor) expressing tissues. Vitamin D is believed to decrease the likelihood of developing psoriasis through multiple mechanisms. These actions involve the inhibition of T-cell proliferation, reduction of antigen presenting cell function, induction of hypo-responsiveness to antigens, decrease in levels of cytokines such as Interleukin-2/8/17 or Interferon-α/γ, promotion of Interleukin-10 production, and enhancement of regulatory T cell (Treg) generation. In addition, vitamin D plays a regulatory role in the synthesis of antimicrobial peptides such as human beta-defensin 2 (HBD2) and cathelicidin, which are involved in the development of psoriasis.[15,16]
The average serum 25-hydroxyvitamin D level in the psoriatic group was 18.02 (±SD 9.82) ng/ml, while in the control group it was 24.47 (±SD 6.77) ng/ml.
The serum 25-hydroxyvitamin D levels in the psoriatic group were significantly lower than those in the control group (p=.001). The majority of patients in the psoriatic group exhibited either deficient (37.5%) or insufficient (50%) levels of serum 25-hydroxyvitamin D. In line with our research, a separate study carried out in eastern Nepal also found that the average concentration of serum 25-hydroxyvitamin D in psoriasis cases was 19.57 (SD 6.85) ng/mL, while in the control group it was 23.63 (SD 6.40) ng/mL. The observed difference was statistically significant (p=.001).[17]
Other studies have also noted a significant decrease in serum 25-hydroxyvitamin D levels in patients with psoriasis[.18–20] Nevertheless, a research conducted in Brazil did not observe a significant reduction in serum 25-hydroxyvitamin D concentrations among patients with psoriasis.[21] Despite a negative correlation between serum 25-hydroxyvitamin D levels and Psoriatic Area and Severity Index (PASI) score, this correlation did not reach statistical significance (p=.493). Our study is comparable to There is a significant correlation. The term "on" was not found between the terms PASI and serum 25-hydroxyvitamin D concentration. ons in

Additional studies that have been made available to the public.[20,22]. However, certain studies have discovered a substantial correlation.

Overall, the levels of serum 25-hydroxyvitamin D in patients with psoriasis were significantly lower compared to the control group. This is in spite of the absence of any significant distinctions between the two groups in terms of age, gender; time spent outdoors, alcohol consumption, smoking, Fitzpatrick skin type, and Body Mass Index. Therefore, our study provides further evidence indicating the complex connection between vitamin D levels and chronic autoimmune or inflammatory diseases like Psoriasis. Interestingly, certain studies have also suggested a therapeutic function for vitamin D supplementation in patients with psoriasis.[23]Therefore, it may be advisable to evaluate the levels of 25-hydroxyvitamin D in the blood and administer oral vitamin D supplements to individuals with psoriasis.

Conclusion

To summarise, this study showed a notable reduction in serum 25-hydroxyvitamin D levels in patients with psoriasis compared to the control group. This emphasises the need for regular assessment and potential adjustment of serum 25-hydroxyvitamin D levels in patients with psoriasis.

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