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Serum Levels Of 25-Hydroxyvitamin D In Chronic Plaque Psoriasis

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Abstract

Introduction: Psoriasis is an immune mediated inflammatory disease that involves the innate and acquired arm of immunologic system. The regulatory role for vitamin D in immune system is suggested by presence of vitamin D receptors on activated lymphocytes and suppressive or inhibiting effect of 1,25-dihydroxyvitamin D in different autoimmune diseases. Hence, the current proposed study aims to study the 25-hydroxyvitamin D status of patients with psoriasis.

Objective: The primary objective of this study was to analyze the 25-hydroxyvitamin D status of patients with chronic plaque psoriasis in comparison to healthy control subjects.

Materials and Methods: A comparative cross-sectional study, including forty patients with chronic plaque psoriasis and forty age- and sex-matched control subjects, was conducted from April 2021 to December 2022, atour dermatology department. After informed consent, all patients were subjected to detailed clinical and anthropometric examination. Serum concentration of 25-hydroxyvitamin D was evaluated in chronic plaque psoriasis cases and healthy control subjects. Data was analyzed as per standard statistical protocol.

Results: The mean serum 25-hydroxyvitamin D level in psoriatic group and control group were 18.02 (±SD 9.82) ng/ml and 24.47 (±SD 6.77) ng/ml, respectively. (p=.001) Serum 25-hydroxyvitamin D was negatively correlated with Psoriatic area and severity index (PASI) score (r=-.11). However, this correlation was not significant (p=.493).

Conclusion: Serum 25-hydroxyvitamin D levels were significantly lower in psoriatic patients than in control subjects.

Key words: 25-hydroxyvitamin D; Psoriasis;Psoriasis area severity index

Introduction

Psoriasis is a chronic immune-mediated inflammatory disease primarily affecting skin. However, currently psoriasis is considered a systemic pathology, whose manifestations range from psoriatic arthritis to obesity and metabolic disease. The exact etiopathogenesis of psoriasis is not understood completely. Immunological, genetic, hormonal and psychosomatic factors are important in causation of the disease.[1]

Vitamin D is a fat-solublemicronutrient. It is obtainedthrough diet and by synthesis in skin upon ultraviolet B exposure. Vitamin D, then undergoes conversionin liver to 25-hydroxyvitamin D, its major circulating form. This circulating form is the best indicator of vitamin D nutritional status and is easily measured. In kidney, 25-hydroxyvitamin D is converted to 1,25-dihydroxyvitamin D, the biologically active form.[2]

The immuno-regulatory role for vitamin D in immune system is suggested by presence of vitamin D receptors on lymphocytes.Also, theinhibitory effect of 1,25-dihydroxyvitamin D in different autoimmune diseases further justifies this role. Vitamin D suppresses production of variousinflammatory mediators like interleukins (IL-2; IL-6) and interferon gamma.Interplay between T helper cells (Th17) and Vitamin D in psoriatic patients is also existent. Moreover, vitamin D promotes suppressor T-cell activity and inhibits cytotoxic and natural killer cell formation. Therapeutic effects of topical Vitamin D and its analogs on psoriatic lesions are due to combination of the mechanisms of reduced cellular proliferation, increased cellular

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differentiation, and immunomodulation.Therapeutic role of oral Vitamin D in treatment of psoriasis is also documented.[3]

Owing to the immuno-modulatory role of vitamin D, the current study was undertaken to evaluate the serum 25-hydroxyvitamin D levels in psoriatic patients. Moreover, our study willenable clinicians to consider Vitamin D supplementation in psoriatic patients and hence, lead to better overall management of patients.

Materials and Methods

After obtaining approval from Institutional Review Committee (IRC Reference Number: 077/078/44), the current cross-sectional comparative study was carried out from April, 2021 to December, 2022. The study was conducted in outpatient department of dermatology unit of KIST Medical College. Using non probability purposive sampling method, forty cases of chronic plaque psoriasis, aged between 18 and 65 years, were recruited in the study. This formed the psoriatic group of patients. Chronic plaque psoriasis cases under any form of treatment or vitamin D supplementation were excluded from the study. Also, patients with co-existent chronic inflammatory disorders like multiple sclerosis, inflammatory bowel disease, rheumatoid arthritis, insulin dependent diabetes mellitus, lupus erythematosus, cutaneous lymphoma, non-melanoma skin cancer, or any other cancer were excluded. The study also includedforty age- and sex-matched healthy subjects, who formed the control group.

Upon receiving informed consent, all presumptive cases of chronic plaque psoriasis were subjected to a detailed history and clinical examination, including anthropometric examination. Histopathological confirmation of diagnosis was performed routinely. Psoriatic area and severity index (PASI) score was obtained. Age and sex matched controls were recruited from healthy volunteers. Both, psoriatic cases and control patients were subjected to evaluation of serum 25-hydroxyvitamin D levels using chemiluminescence immunoassay. Based on serum 25-hydroxyvitamin D, vitamin D status was classified as deficient: <20 ng/ml, insufficient: 20–29 ng/ml, and sufficient: 30–100 ng/ml.[4]

A self-designed proforma was used to collect all relevant data. The collected data was analyzed using Statistical Package of Social Sciences (SPSS) version 26 (SPSS Inc., Chicago, USA). All analysis was performed as per standard statistical protocol. Student t-test and Chi-square test were used to compare means of parametric and non-parametric data, respectively. Correlation was ascertained using Pearson correlation. P-value less than or equal to .05 was considered significant.

Results

The psoriatic group and control group each comprised forty subjects. The mean age of patients in psoriatic group was 40.92 (±SD 14.87) years. Similarly, the mean age of control group was 40.88 (±SD 14.22). Majority of patients in psoriatic group were males (n=21; 52.5%), while females comprised 47.5% of the patients (n=19). The control group also had similar gender distribution. No significant differences, with respect to time spent outdoors (p=.912), alcohol consumption (p=.313), smoking (p=.856), Fitzpatrick skin type (p=.180) and Body Mass (p=.883) Index were present in between two groups. (Table 1)

Table 1: Epidemiological characteristics in between Psoriatic and Control Group

Variables	Psoriatic Group (n=40)	Control Group (n=40)	P-value
Age (years)	40.92 (±SD 14.87)	40.88 (±SD 14.22)	.988
Gender • Male (n) • Female (n)	 21 (52.5%) 19 (47.5%)	 21 (52.5%) 19 (47.5%)	1000
Time Spent Outdoors (hours/week)	13.54 (±SD 8.27)	13.34 (±SD 7.85)	.912
Smoking (pack years)	.57 (±SD 1.60)	.50 (±SD 1.84)	.856
Alcohol(grams/day)	1.68 (±SD 4.21)	.82 (±SD 3.32)	.313
Fitzpatrick Type • III (n) • IV(n)	 15 (37.5%) 25 (62.5%)	 19 (47.5%) 21 (52.5%)	.180
Body Mass Index	24.72 (±SD 4.29)	24.59 (±SD 3.84)	.883

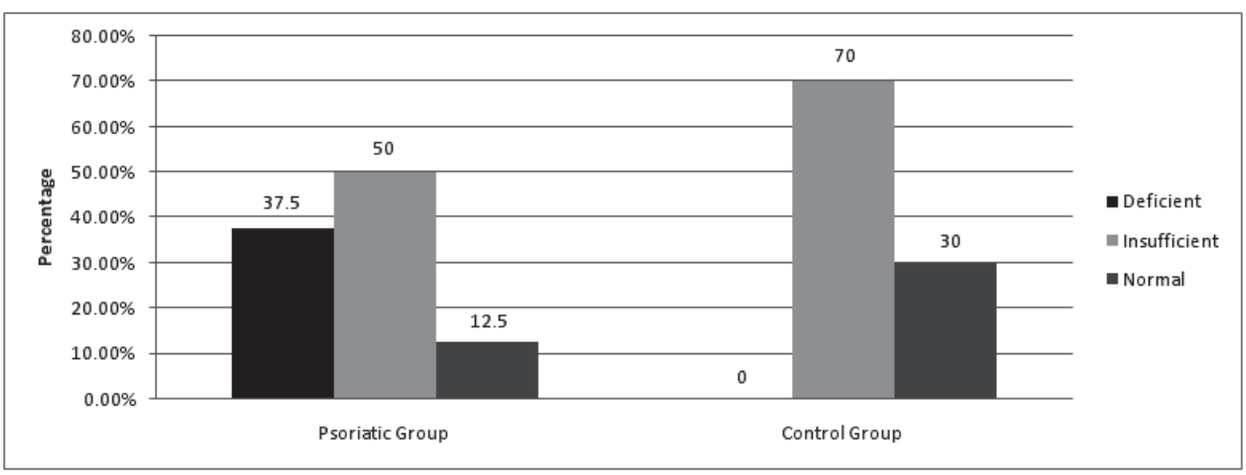
In the psoriatic group, the mean duration of disease was 4.24 (±SD 4.97) years. Majority of patients belonged to 41-50 years age group (n=11; 27.5%), followed by 21-30 years group (n=10; 25%). Hypertension and diabetes mellitus were present in six (15%) and five patients (12.5%), respectively. The mean Psoriatic area and severity index (PASI) score in patients was 6.71 (±SD 6.27). The mean Body Mass Index of psoriasis patients was 24.72 (±SD 4.29). Majority of our psoriasis patients had normal BMI (n=21; 52.5%). (Table 2)

Table 2: Body Mass Index distribution in Psoriatic Group

Group	Frequency (n)	Percentage (%)
Underweight (<18.5)	03	07.5
Normal (18.5-24.9)	21	52.5
Overweight (25-29.9)	10	25.0
Obese (≥30)	06	15.0
Total	40	100

The mean serum 25-hydroxyvitamin D level in psoriatic group and control group were 18.02 (±SD 9.82) ng/ml and 24.47 (±SD 6.77) ng/ml, respectively. (p=.001) Majority of patients in psoriatic group had either deficient (n=15; 37.5%) or insufficient (n=20; 50%) levels of serum 25-hydroxyvitamin D. Only five patients (12.5%) in psoriatic group had normal levels. Subjects in the control group had either insufficient (n=28; 70%) or normal (n=12; 30%) levels of serum 25-hydroxyvitamin D. (Figure 1) Serum 25-hydroxyvitamin D was negatively correlated with PASI score (r=-.11). However, this correlation was not significant (p=.493).

Figure 1: Serum 25-hydroxyvitamin D levels distribution in Psoriatic Group versus Control Group



Discussion

Vitamin D is a fat-solublemicronutrient. The most stable form of this micronutrient is 25-hyroxy vitamin D having a half-life of 2–3 weeks. Hence, assessment of 25-hyroxy vitamin D levels is routinely used to ascertain vitamin D status. In addition to the endocrine effects of Vitamin D on calcium homeostasis,the autocrine or paracrine effects of Vitamin D on CYP27B1(Cytochrome P450 Family 27 Subfamily B Member 1)and VDR (vitamin D receptor) expressing tissues is well documented. Vitamin D is thought to reduce the risk of psoriasis in multiple ways.These include inhibition of T-cell proliferation, decreasing antigen presenting cell function, causing hypo-responsiveness to antigens, decreasing levels of cytokines like Interleukin-2/8/17 orInterferon-α/γ, enhancing production of Interleukin-10 and regulatory T cells (Tregs). Furthermore,vitamin D has regulatory effect on synthesis of antimicrobial peptideslike human beta-defensin 2 (HBD2) andcathelicidin, which are implicated in etiopathogenesis of psoriasis.[5,6]

In our study, the mean serum 25-hydroxyvitamin D level in psoriatic group and control group were 18.02 (±SD 9.82) ng/ml and 24.47 (±SD 6.77) ng/ml, respectively. In our study, the serum 25-hydroxyvitamin D levels in psoriatic group were significantly lower than the control group (p=.001). Majority of patients in psoriatic group had either deficient (37.5%) or insufficient (50%) levels of serum 25-hydroxyvitamin D. Similar to our study, another study conducted in eastern Nepal also reported mean serum 25-hydroxyvitamin D concentration in psoriasis cases as 19.57 (±SD 6.85) ng/mL and in control group as 23.63 (SD ± 6.40) ng/mL. The observed difference was significant (p=.001).[7] Several other studies have also observed a similar significant decrease in serum 25-hydroxyvitamin D levels in psoriasis patients.[8–10] However, a study conducted in Brazil found no significant decrease in serum 25-hydroxyvitamin D concentrations in psoriasis patients.[11] Although, serum 25-hydroxyvitamin D levels were negatively correlated with Psoriatic area and

severity index score (PASI), this correlation did not achieve significance (p=.493). Similar to our study a significant correlation was not found in between PASI and serum 25-hydroxyvitamin D concentrations in other published studies.10,12 In contrast, some studies have found a significant correlation.[7]

In summary, the serum 25-hydroxyvitamin D levels in psoriasis patients were significantly decreased when compared to control group. This is despite no significant differences; with respect to age, gender, time spent outdoors, alcohol consumption, smoking, Fitzpatrick skin type and Body Mass Index; in between two groups. Hence, our study lends support tothe growing body of evidence indicating the intricate relationship between vitamin D levels and chronic autoimmune or inflammatory diseases such as Psoriasis. Interestingly, some studies have also indicated a therapeutic role for vitamin D supplementation in psoriasis patients.[13] Hence, serum 25-hydroxyvitamin D levels assessment and oral vitamin D supplementation may be considered in psoriasis patients.

Conclusion

In conclusion, this study demonstrated significantly decreased levels of serum 25-hydroxyvitamin D in psoriatic patients when compared to control subjects. This highlights the necessity for routine evaluation and possible correction of serum 25-hydroxyvitamin D concentrations in psoriasis patients.

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