


Original Research Article

Serum Vitamin D Level in Psoriasis: A Prospective Study in a Tertiary Care Centre of Eastern India

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Abstract

Background: Psoriasis is a systemic, inflammatory, chronic autoimmune disease characterized by multiple discoid plaques over body with silvery scales associated with cardiovascular diseases, obesity, diabetes mellitus, hypertension, and hyperlipidemia. Recently, association between psoriasis and Vitamin D level has also been reported. Our aim of study was to evaluate the association of vitamin D and its association with the severity of Psoriasis

Materials and methods: 60 patients diagnosed with psoriasis, in our outpatient department from January 2021 to December 2021, were included the study. 58 age, gender- and skin phototype-matched healthy controls were included in the study.

Results: The serum vitamin D level in patients and in the control group ranged from 7 to 24 ng/ml (mean: 13.04 ±8.32 ng/ml) and from 16 to 65 ng/ml (mean: 23.91±6.08 ng/ml), respectively. The circulating vit D levels were less in patients compared to control. The analysis showed statistical significance ($P < 0.05$) between the two groups.

Conclusion: Our results showed decreased level of vitamin D in patients suffering from psoriasis when compared to healthy controls. Vitamin D supplementation can be useful in psoriasis management.

Key words

Vitamin D level, Psoriasis, Autoimmune disease.

Introduction

Psoriasis is a chronic recurrent papulosquamous skin disorder characterized by epidermal hyperplasia. It clinically manifests as erythematous well demarcated plaques covered with a silvery white scale. It ranges in severity from a few plaques to involvement of almost the entire body surface [1]. There is increased mitotic activity of the basal cell layer of epidermis resulting in rapid epidermal cell turnover. The normal epidermal cell cycle of 28 days is reduced to 5 days. This results in defective keratinization and formation of psoriatic plaques with silvery scales. Histologically, it is characterized by a significantly thickened epidermis with increased mitotic activity and by the presence of immature nucleated cells in the horny layer and reduced production of intracellular filaments and granules seen within normal keratinization and retention of nucleoli in the upper cell layer known as parakeratosis [2].

Vitamin D is an essential hormone that is synthesized in the skin [3]. The active form of vitamin D, 1,25-dihydroxyvitamin D₃, is a hormone that regulates calcium and bone metabolism, controls cell proliferation and differentiation and also exhibits certain immunoregulatory function [4]. Low level of Vitamin D has role in increasing the risk of many chronic diseases. It has a specific role in cellular proliferation and differentiation. Vitamin D receptors are found in many tissues and cells in the body. It is found to be an immune regulatory hormone with beneficial effects on inflammatory diseases, mediated by helper T lymphocytes type 1 (Th1) and Th17 cells such as diabetes, psoriasis and vitiligo [3, 4].

With this background, we wanted to know the status of serum vitamin D levels in patients with psoriasis visiting our center and also their correlation with the severity of disease.

Materials and methods

In total, 60 patients diagnosed with psoriasis, in our outpatient department from January 2021 to December 2021, were included the study; 58 age, gender- and skin phototype-matched healthy controls also participated. The patients were examined by the same dermatologist and the diagnosis of psoriasis was made according to clinical finding. Detailed disease and family histories were recorded from all patients in predefined performa. Various demographic were recorded, including age, gender, skin phototype, seasonal exacerbations, and provoking factors. Participants with liver or kidney disorders, autoimmune diseases, hyperparathyroidism, hypoparathyroidism, any metabolic bone disorders (e.g. osteoporosis or osteopenia) or inflammatory diseases were excluded from the study, as were those taking vitamin D- or calcium-including drugs, or any systemic or topical treatment for psoriasis within the previous month. Controls were taken from the relatives of patients, if not affected by psoriasis to minimize differences due to dietary intake of vitamin D. Informed consent was obtained from all participants. Approval of Institute Ethics Committee was obtained before starting the study. The conducted in accordance with the tenets of the Declaration of Helsinki. Blood samples were taken in the morning after a minimum fasting period of 8 hours. Complete blood count, Serum free T₃, free T₄, thyroid stimulating hormone, liver function test fasting glucose and vitamin D levels were measured.

Statistical analysis

The results of this study were analysed using SPSS Software, Version 17 (SPSS Inc., Chicago, USA). Continuous and categorical variables were presented as Mean±SD and percentages respectively. A statistically significant difference was considered at the level of $p < 0.05$.

Results

Out of sixty (60) patients included in our study population, there were 32 males (53%) and 28 females (47%). The control population

comprised of twenty four (40%) females and thirty six (60%) males. The mean ages of the patient were 32.16 ± 10.26 and that of control groups were 33.35 ± 9.33 years. No statistically significant difference was established between the patient and control population in terms of gender or age. Mean age of patients was 33.46 ± 4.46 year. The **Table - 1** shows that maximum number of cases.

Table – 1: Age distribution of psoriasis (n=60). Age (years) N (%).

| Age (years) | N (%) |
|--------------|-----------|
| 0-10 | 3 (5) |
| 11-20 | 5(8.3) |
| 21-30 | 11 (18.3) |
| 31-40 | 12 (20) |
| 41-50 | 10 (16.6) |
| 51-60 | 13 (21.6) |
| 61-70 | 4 (13.3) |
| >70 | 2 (3.3) |

21.6% was in the age group of 51-60 years, followed by 20% in the age group of 31-40 years, 18.3% in the age group 21-30 years, 5% in 11-20 years, 3% in the age group 0-10 years.

Commonest type of Psoriasis noted in our study was psoriasis vulgaris (48.3%) followed by palmoplantar psoriasis (25%) guttate (8%), erythrodermic psoriasis (5%) and generalized pustular psoriasis (3%) (**Table – 2**). Biochemical markers in cases and control group were as per **Table – 3**.

Table - 2: Different types of psoriasis (n=60).

| Type of Psoriasis | N (%) |
|--------------------------------|-----------|
| Psoriasis vulgaris | 29 (48.3) |
| Guttate psoriasis | 8 (13.3) |
| Palmoplantar psoriasis | 15 (25.0) |
| Generalized pustular psoriasis | 3 (5.0) |
| Erythrodermic psoriasis | 5 (8.3) |

Investigations done (blood analysis) from all the patients enrolled in the study from January 2021 to December 2021 were analyzed for serum 25 hydroxy vit D3. The vit D values in patients' and in the control group ranged from 7 to 24 ng/ml (mean: 13.04 ± 8.32 ng/ml) and from 16 to 65 ng/ml (mean: 23.91 ± 6.08 ng/ml), respectively. The circulating vit D levels were less in patients compared to control the analysis showed statistical significance ($P < 0.05$).

Table - 3: Biochemical markers in cases and control group.

| Biochemical markers | Cases (n=60) | | Control (n=60) | | P value |
|---------------------|---------------|----------|-----------------|----------|------------|
| | Normal | Abnormal | Normal | Abnormal | |
| Serum Vit D level | 17 | 43 | 48 | 12 | $P < 0.05$ |
| Serum uric acid | 22 | 38 | 49 | 11 | $P < 0.05$ |
| Serum blood urea | 21 | 39 | 54 | 06 | $P < 0.05$ |
| Serum creatinine | 18 | 42 | 51 | 09 | $P < 0.05$ |
| Serum triglycerides | 16 | 44 | 47 | 13 | $P < 0.05$ |

Table – 4: Biochemical markers before and after treatment.

| Biochemical markers | Baseline | | At 12 weeks follow up after treatment | | P Value |
|---------------------|-------------|------------|---------------------------------------|-----------|------------|
| | Normal | Abnormal | Normal | Abnormal | |
| S. albumin level | 28 (46.6%) | 32 (53.3%) | 54 (90 %) | 02 (3.3%) | $P < 0.05$ |
| Serum calcium | 52 (86.6 %) | 8 (13.3%) | 60 (100%) | 0 | $P < 0.05$ |
| Serum uric acid | 46 (76.6%) | 14 (23.3%) | 58 (96.6%) | 02 (3.3%) | $P < 0.05$ |
| S. creatinine | 56 (93.3%) | 4 (6.6%) | 60 (100%) | 0 | $P < 0.05$ |
| Liver function test | 53 (88.3%) | 7 (11.6%) | 59 (98.3%) | 01 (1.6%) | $P < 0.05$ |

The commonest triggering factor in psoriasis patients was stress seen in 14 (23%) patients. Other factors were drugs in 4 (6%) patients, alcoholism in 01 (1.6%), trauma in 7 (11%), and sunlight in 2 (3.3%) patients. Different biochemical parameters before and after treatment are shown in **Table - 4**.

Discussion

Psoriasis is a chronic systemic disease with an immune-inflammatory etiology, affecting approximately 2%–3% of the world's population, and characterized by T-cell-mediated hyperproliferation of keratinocytes [7].

Psoriasis is most likely to appear between the ages of 15 and 30 years but ranges from birth to the eighth or ninth decade with bimodal distribution. In our study the maximum number of patients belonged to age group of 31-40 years followed by 51-60 years in psoriasis patients. One study in United Kingdom showed bimodal distribution of disease, the peak being 16-22 years and 57-60 years [8]. Our study showed that the median age of 40 years. Likewise, in a study done by Solak et al the median age was 40 years. Another study by Das et al [9] showed mean age of 39.7 ± 7.3 years among psoriasis group [9].

There was slight male preponderance with male: female ratio of 1.48:1 in our study. Similarly, male patients outnumbered female patients in a study conducted by Khandpur [10] on palmoplantar psoriasis. In contrast, in Kumar, et al. [11] and Chopra, et al. [12] studied, both men and women were almost equally involved.

The most common initial site of involvement in a study done in Kochi, India was the scalp (28%) followed by the elbow (22%), which diverged from our observations [13]. The most typical sites of involvement in earlier studies were the scalp (49.6% [16]; 79.8% [14]), lower legs (72.6% [12]; 87% [15]). This contrasts with the hand involvement among the majority of patients in the present study, which could be because the

hands are exposed, easily visible, and highly prone to trauma.

Vitamin D plays a critical role in psoriasis, and this is evidenced in many studies which reported either a deficiency or insufficiency of serum vitamin D in psoriatic patients [16, 17]. Epidemiological evidence indicates a significant association between vitamin D deficiency and an increased incidence of auto-immune diseases. The presence of vitamin D receptors in the cells of the immune system and the fact that several of these cells produce the vitamin D hormone suggested that vitamin D could have immunoregulatory properties, and now potent immunomodulatory activities on dendritic cells, Th1 and Th17 cells, as well as B cells have been confirmed [18]. Several case-control studies have shown significant lower levels of serum 25(OH)D in psoriatic patients compared to controls and reported an inverse correlation between serum 25(OH)D and the severity of the disease [19, 20]. These results are comparable to that of the present study. On the other hand, in a population-based screening, Wilson showed that vitamin D deficiency is not common in psoriatic patients and that there is no significant difference in serum 25(OH)D levels in subjects with or without psoriasis [21]. This can be explained by the fact that, the 25(OH)D level varies with several factors, including race, dietary intake, and UV light exposure. In addition, vitamin D insufficiency is a common finding in normal populations.

Lower vitamin D levels in patients with psoriasis than the ordinary population may be due to a multiple factors. low 25(OH)D levels can either signify the cause or consequence of psoriasis, because of from lack of sun exposure, from frequent use of drugs that interfere with 25(OH)D metabolism (such as glucose-corticoids and immunosuppressive agents), or from low 25(OH)D intake [22, 23]. Patients suffering from psoriasis, except those undergoing phototherapy, tend to keep their affected body areas covered. This behavior, can gradually over long time can lead to decreased sun exposure resulting in

decreased vitamin D levels. Hence, those suffering from long term psoriasis, could possibly be more predisposed to reduced vitamin D levels [23].

Conclusion

To conclude, our results showed decreased level of vitamin D in patients suffering from psoriasis when compared to healthy controls. More studies are required to clarify the importance of Vitamin D level in psoriasis and its relationship to pathogenesis and severity of the disease. The limitations of our study were hospital-based study and the small number of patients. Further community-based studies are required to confirm our results.

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