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Original Research Article

A Case Control Study of Vitamin D Deficiencyin Psoriatic Patients

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Abstract

Background: A systemic, inflammatory, chronic autoimmune disease with silvery scales covering the body, psoriasis is linked to obesity, diabetes mellitus, hypertension, hyperlipidemia, and cardiovascular problems. There has also been recent news of a link between vitamin D levels and psoriasis. This study's primary goal was to compare the vitamin D status of psoriasis patients to that of healthy controls.

Methods: This study is a case-control, observational epidemiology study. From June to August of 2023, it was held at the outpatient department of dermatology and venereology at the Radha Devi Jageshwari Memorial Medical College and Hospital, Turki, Muzaffarpur, Bihar. In this study, 140 individuals were recruited and divided into two groups: 50 patients with psoriasis and 90 healthy controls. The level of vitamin D3 in both groups was measured.

Results: When comparing males and females, the vitamin D levels in the control group were similar (P value = 0.263). Winter had the lowest vitamin D levels, while autumn had the greatest (P value < 0.001). Vitamin D3 levels were lower in underweight individuals and greater in those with a normal body mass index (P value=0.002). There was a significant difference in vitamin D levels between males and females in the psoriatic group (P value = 0.007). When comparing variable age groups (P value = 0.142), seasonal variation (P value = 0.387), and body weight (P value = 0.676), no significant differences were found. When comparing the vitamin D3 levels of the psoriatic group and the control group, there was a significant difference (P value < 0.001).

Conclusion: Comparing the psoriatic group to the control group, vitamin D3 levels were considerably lower.

Keywords: Healthy control, Severity, Psoriasis, Vitamin D deficiency.

Introduction

An immune-mediated skin condition with a protracted course, psoriasis is caused by a combination of environmental triggers, including medicines, stress, trauma, infection, endocrinological variables, and others, and hereditary susceptibility. Psoriasis is estimated to affect 2.3% of the population in Iraq, with a prevalence of 2-3% worldwide and no gender preference [1, 2]. Psoriasis is thought to be a condition of proliferating keratinocytes in the epidermis as a result of dermal lymphocytes that have been activated. [3-6]

Vitamin D is a fat-soluble vitamin that can be obtained from fish and plants (ergocalciferol) or produced by the body (cholecalciferol), which is vitamin D's active metabolite, 1, 25(OH)2D. In the skin, 1, 25(OH)2D and its receptor (VDR) both have critical functions. [7] It's unclear how exactly a vitamin D deficit contributes to the etiology of psoriasis. Numerous theories have been put out, one of which being the loss of vitamin D's anti-proliferative effect, since calcitriol exposure was observed to significantly restrict growth and accelerate maturation in human cultured keratinocytes. [8–9] Additionally, as angiogenesis and inflammation are the primary factors in the pathophysiology of psoriasis, the reduction of vitamin D anti-inflammatory and anti-angiogenic properties may offer an additional explanation for how vitamin D deficiency contributes to psoriasis. [10–11] Lack of vitamin D leads to two key processes in the pathophysiology of psoriasis: unregulated Th1 and 17 cell proliferation on the one hand, and unchecked Treg inhibition on the other. Human beta defensins (HBD) 2 and HBD3, as well as IL-17A, IL17F, and IL-8, have been demonstrated to dramatically lower cutaneous levels when calcipotriol is applied topically. These findings further connect vitamin D deficiency to the pathophysiology of psoriasis. [12, 13]

Material and Methods

This study included a total of 50 outpatients who had a clinical diagnosis of psoriasis. Clinical bases were used to establish the diagnosis of psoriasis.

Both genders and all age categories were represented. Every psoriasis clinical manifestation. The level of vitamin D was assessed regardless of the season. people with existing psoriasis who have not taken topical medication in the last three months or who have taken systemic medication in the last six months.

Ninety healthy individuals were chosen after being matched to the patient group in terms of age, gender, and amount of daily sun exposure. The subjects came to the outpatient department of dermatology and venereology at Radha Devi Jageshwari Memorial Medical College and Hospital, Turki, Muzaffarpur, Bihar, from June 2023 to August 2023 as friends or family members of the patients.

This study excluded the following patients: psoriatic female patients who were pregnant or nursing; psoriatic patients who regularly applied sunscreen; patients complaining of any concurrent systemic or skin diseases or infections; patients receiving supplements or vitamins; and patients receiving treatment for any systemic conditions.

A thorough history was taken of all enrolled patients, including the length of time, family history, existence of other autoimmune disorders, and past course of treatment. Every patient underwent a thorough physical examination, which included assessing the psoriatic lesions' size, location, erythema, and scales. Subsequently, the body surface area (BSA) affected and the psoriasis activity score index (PASI) were used to determine the severity of psoriasis, which was then divided into two categories: mild (PASI <10) and moderate to severe (PASI ≥10). [14]

Fitzpatrick's skin type classification was used to determine the individuals' skin phenotype, regardless of whether they were in the control group or the psoriatic group. [15] The Lund and Browder chart, which was initially employed for the initial assessment of body sections implicated in serious burns, was utilized to evaluate the body proportion exposed to sunlight. [16]

Serum 25-hydroxyvitamin D3 (25(OH) D3) was measured in blood samples; a level of less than 20 ng/ml is regarded a vitamin D deficiency, 20–30 ng/ml is considered an insufficiency, and 30-100 ng/mL is deemed sufficient. Verbal agreement was gained from each patient after the goal and protocol of the study were explained by the administration of our institution's dermatology department.

The collected data was organized, tabulated, and statistically analyzed using Statistical Package for Social Science (SPSS) version 26.

Values were expressed as mean ± standard deviation (SD). Significant levels were set as P values ≤ 0.05 in all cases.

Results

Table 1 and 2 show that there was no significant difference in age, BMI, or the percentage of body surface area exposed to direct sunlight. However, there was a significant difference in the amount of sunshine exposure between the psoriatic and control groups (P-value= 0.005).

Table 1: Socio-demographic characteristics of the psoriatic and the control groups (males)

Parameters	Psoriatic males	Control males	P-value*
Number of participants	23	44	
Age (years) mean ± SD	31.11 ± 16.03	30.77 ± 15.69	0.886
BMI (kg/m2), mean ± SD	25.92 ± 4.47	26.30 ± 4.35	0.569
Skin phenotype 2	0	2	
3	13	23	
4	9	18	
5	1	1	
Daily sun exposure time (hours)	2.77 ± 1.41	2.22 ± 1.08	0.011
Surface area exposed to sun%	18.90 ± 2.87	19.35 ± 4.12	0.294
Alcohol consumers %	2 (8.69%)	2 (4.54%)	
Smokers %	14 (60.86%)	26 (59.09%)	

* Student's t-test was applied.

Table 2: Socio-demographic characteristics of the psoriatic and the control groups (females)

Parameters	Psoriatic females	Control females	P-value*
Number of participants	27	46	
Age (years) mean ± SD	24.17 ± 13.00	29.62 ± 15.51	0.004
BMI (kg/m2), mean ± SD	23.86 ± 4.04	24.47 ± 4.25	0.284
Skin phenotype 2	4	9	
3	13	25	
4	10	11	
5	0	1	
Daily sun exposure time (hours)	1.58 ± 0.86	1.35 ± 0.52	0.053
Surface area exposed to sun%	14.84 ± 3.37	14.97 ± 4.66	0.800
Alcohol consumers %	0 (0%)	0 (0%)	
Smokers %	1 (3.70%)	4 (8.69%)	

* Student's t-test was applied.

Psoriasis ranged in duration from 2 weeks to 30 years, with a mean of 68.14±75.65 months. When comparing the length of the illness in the two genders, there was no discernible difference (P-value=0.283). The male to female ratio in this study was 1.6:1, indicating a higher incidence of moderate to severe psoriasis in male patients (10 males vs. 6 females). Vitamin D levels were substantially greater in the male psoriasis patients than in the female patients (P-value=0.007), while there was no significant difference between the male and female control population (P-value= 0.263).

The patients were further divided into 33 (66%) with mild psoriasis (PASI <10) and 15 (30%) with moderate to severe psoriasis (PASI >10) based on their PASI scores. Since the PASI score in these variants cannot be determined, patients with erythrodermic psoriasis (one male patient) and guttate psoriasis (one male patient) were excluded from both of the aforementioned categories. The male to female ratio in this study was 1.6:1, indicating a higher incidence of moderate to severe psoriasis in male patients (10 males vs. 6 females). With a P-value of 0.001, vitamin D levels were substantially lower in 30% of patients with a PASI score of less than 10 (7.77±3.38) than in 66% of patients with a score of less than 10 (10.98±5.12).

When vitamin D levels were measured, the psoriatic group had a mean of 9.88± 4.77 ng/ml (P-value < 0.001), while the control group had a mean of 20.12 ng/ml±10.87 ng/ml standard deviation. In this investigation, vitamin D levels were found to be insufficient in 14 control subjects (15.55%), insufficient in 47 patients (94%) and 60 control subjects (66.66%), and deficient in 3 patients (6%) and 16 control subjects (17.77%). Seasonal variation appears to have a substantial effect on vitamin D levels in the control group (P-value <0.001), while there is no significant difference within the psoriatic group (P-value = 0.387), as shown in [table 3].

Table 3: Effects of seasonal variations on vitamin D levels

Seasons	**Psoriatic group** Vitamin D3 level mean± SD	**Control group** Vitamin D3 level mean± SD	**P value***
Winter	9.42±3.86	15.13±7.93	0.000
Spring	10.32±4.83	16.63±6.73	0.000
Summer	9.09±5.36	23.34±9.78	0.000
Autumn	11.43±4.57	23.77±13.36	0.000
P value**	0.387	0.000	

* Student's t-test was applied.
** Two-way ANOVA test was applied.

The relationship between body mass index (BMI) and vitamin D levels is shown in Table 4, where it was not substantially different in the psoriatic group (P-value=0.676) and considerably different in the control group (P-value< 0.001).

Table 4: Effects of body mass index on vitamin D levels

BMI	**Psoriatic group** Vitamin D level Mean ± SD (ng/ml)	**No.**	**Control group** Vitamin D level Mean ± SD (ng/ml)	**No.**	**P-value***
Underweight	10.82 ± 6.42	8	13.38 ± 6.53	27	0.160
Normal range	10.05 ± 4.53	15	23.29 ± 13.54	39	0.000
Overweight	9.56 ± 4.56	27	19.58 ± 9.38	24	0.000
P-value**	0.676		0.005		

* Student's t-test was applied.
** Two-way ANOVA test was applied.

Discussion

This study aimed to explain the complex association between vitamin D levels and psoriasis and to provide all the factors that may have contributed to it. Iraq and the Gulf region were among the several nations where numerous investigations had previously been carried out. Psoriasis and vitamin D insufficiency were found to positively correlate in the majority of research, while a small number of them showed no discernible relationship at all. [17, 18]

Twenty published papers involving 2046 psoriatic patients—with or without arthritis—and 6508 healthy controls were used in Al-Dhubaibi's exploratory investigation. Six research did not indicate a significant association between the two variables under investigation, while fourteen investigations demonstrated a favorable correlation between vitamin D insufficiency and psoriasis. [18] In Mashhad, Iran, Maleki et al. evaluated 50 psoriatic patients and 43 controls; they discovered no discernible variations in the two groups' vitamin D3 levels. [19] At Umm Alqura University Makkah, Saudi Arabia, Allayali et al. studied 63 psoriatic patients and 63 non-psoriatic people. They once again discovered no discernible difference in the vitamin D3 levels between the two groups. [20] Another study by Al Mutairi et

al. in Kuwait with 100 psoriatic people and 100 controls showed that the psoriatic group had considerably lower vitamin D3 levels. [21] Khalil et al earlier study in Babylon, Iraq, which comprised 45 psoriatic patients and 45 controls, found a substantial difference in the vitamin D3 levels between the groups under investigation.Nevertheless, despite prior therapy attempts, the evaluation of 41 patients (41%) who had experienced psoriasis for longer than five years had not shown any improvement in vitamin D (9.92 ±5.03 ng/ml) status. When compared to the patients who came more recently, the readings showed an even greater drop (although non-significantly) at 11.07 ± 5.46 ng/ml (P-value=0.155). [22]

The aforementioned data could suggest a reciprocal relationship between reduced vitamin D levels and psoriasis. One perspective is that vitamin D plays a pathogenic role in psoriasis, as seen by the elevated risk of developing Th1-mediated autoimmune illnesses, which include psoriasis [23].Conversely, psoriasis itself causes its patients' vitamin D levels to be lower than those of the general population. This could be explained by the basic characteristics of psoriasis, which is a hyper-proliferative condition in which the stratum basale and stratum spinosum are susceptible to accelerated wash off due to the rapid turnover and desquamation of the epidermis. As a result, they are unable to carry out their normal functions, including the synthesis of vitamin D. [24] Due to the usual tendency of psoriatic patients to hide their lesions, which has been developed over time, there may be a decrease in UV exposure and a corresponding drop in vitamin D levels. [25]

Moreover, the dark silver scales associated with psoriasis create opaque barriers over the skin that block UV light from penetrating the epidermis. This reduces the body's ability to synthesize vitamin D in the afflicted areas. The low vitamin D levels (mean 7.94 ± 2.94 ng/ml) seen in patients with psoriasis affecting more than 10% of body surface area lend credence to this theory.

Conclusion

Those with psoriasis have reduced vitamin D levels in comparison to those who are healthy. Wintertime, female gender, longer disease duration, and a bigger body surface area implicated are all linked to reduced vitamin D levels in psoriatic individuals.

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