Deficiency of serum concentration of 25-hydroxyvitamin D in psoriatic patients: A case-control study

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Background: Some autoimmune conditions have been associated with reduced vitamin D levels, including systemic lupus erythematosus, rheumatoid arthritis, diabetes mellitus, and multiple sclerosis.

Objective: The main objective of this study was to analyze the 25-hydroxyvitamin D (OHD) status of patients with psoriasis in comparison with control subjects without this disease.

Methods: This case-control study included 86 patients (43 with psoriasis and 43 age- and sex-matched control subjects) from the outpatient clinic of our hospital dermatology department in Granada, Spain. All patients and control subjects were studied during one 4-week period to avoid seasonal variations in vitamin D levels.

Results: Serum 25-OHD levels were significantly lower in psoriatic patients than in control subjects even after adjusting for confounding factors in a multivariate analysis (odds ratio 2.89, 95% confidence interval 1.02-7.64, $P < .03$ for vitamin D insufficiency). Low 25-OHD levels were negatively associated with C-reactive protein (inflammatory activation marker) and body mass index in multiple linear regression analysis. Psoriatic patients with body mass index greater than or equal to 27 kg/m^2 had a higher risk of 25-OHD insufficiency (sensitivity of 82.3% and specificity of 51.7%).

Limitations: Further studies with larger numbers of patients are required to analyze the pathogenic mechanisms underlying the relationship between 25-OHD deficiency and psoriasis.

Conclusions: The 25-OHD values are significantly lower in psoriatic patients than in control subjects. Low 25-OHD levels are negatively associated with C-reactive protein, an inflammatory activation marker, and with obesity. Psoriatic patients with a body mass index of 27 or more are likely to have vitamin D insufficiency. (J Am Acad Dermatol 2012;67:931-8.)

Key words: autoimmunity; body mass index; C-reactive protein; psoriasis; Psoriasis Area and Severity Index; 25-hydroxyvitamin D.

Psoriasis is a chronic inflammatory disease that involves the innate immunologic system (keratinocytes, dendritic cells, histiocytes, mastocytes, and endothelial cells) and acquired immunologic system (T lymphocytes).[1] Once the innate immune system is activated, dendritic cells present an antigen (not yet defined) to lymphocytes. Finally, a response is generated that leads to an expansion and activation of lymphocytes with a Th1/Th2 imbalance in favor of Th1.[2]

Vitamin D performs different functions besides its well-known role in calcium-phosphorus metabolism, as indicated by the presence of vitamin D receptors (VDRs) and CYP271B (enzyme responsible for 25-hydroxyvitamin D [25-OHD] synthesis) in different tissues.[3-6] An important regulatory role for vitamin D in

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the immune system is suggested by the presence of VDRs on activated T lymphocytes,[7,8] the suppressive or inhibiting effect of 1,25-dihydroxyvitamin D in different autoimmune diseases, and in vitro and in vivo findings of vitamin D–induced changes in immune functions.[9] Furthermore, dermatologists and other physicians have observed the effectiveness of vitamin D analogs to treat psoriasis plaques in daily clinical practice.[10]

Autoimmune conditions associated with reduced vitamin D levels include rheumatoid arthritis (RA), insulin-dependent diabetes mellitus (IDDM), and multiple sclerosis (MS),[11-13] which share some immunologic features with psoriasis, such as Th1/Th2 dysregulation. With this background, we compared 25-OHD levels between patients with psoriasis and control subjects without psoriasis. All patients and control subjects were studied in one 4-week period to avoid seasonal variations in vitamin D levels.

CAPSULE SUMMARY

- Some autoimmune conditions that share immunologic and genetic features with psoriasis have been associated with reduced vitamin D levels.
- In the current study, patients with psoriasis had significantly lower levels of 25-hydroxyvitamin D than control subjects, even after adjusting for confounding factors in a multivariate analysis.
- Low 25-hydroxyvitamin D levels are negatively associated with markers of inflammatory activation (C-reactive protein) and obesity. Patients with psoriasis and a body mass index greater than or equal to 27 are likely to have vitamin D insufficiency.

METHODS

Patients and control subjects

This case-control study included 86 outpatients: 43 patients with psoriasis randomly selected from among patients of the psoriasis unit and 43 randomly selected age- and sex-matched control subjects (28 male and 15 female in each group) with nonphotosensitive dermatologic diseases other than psoriasis (mainly nevi, seborrheic keratosis, or verruca) from the Dermatology Department of San Cecilio University Hospital, Granada, Spain. Randomization was conducted using randomized number tables. All patients were studied during the same period (from May 16 to June 17, 2011) to avoid seasonal variations in vitamin D levels.[14,15] All individuals were from the metropolitan area of Granada to avoid geographic differences in sun exposure and vitamin D levels. No patients or control subjects refused participation in the study.

Diagnosis of psoriasis was based on clinical findings (generalized psoriasis plaques). Inclusion criteria were: age between 18 and 65 years, the presence of plaque psoriasis not treated systemically or topically in the previous month, and the absence of vitamin D supplementation or current phototherapy treatment or the presence of chronic inflammatory disease such as MS, inflammatory bowel disease, RA, IDDM, lupus erythematosus, cutaneous lymphoma, nonmelanoma skin cancer, or any other cancer. Inclusion criteria for control subjects were the same as for cases except for the absence of psoriasis. The study was approved by the Ethics Committee of San Cecilio University Hospital, and written informed consent was obtained from all patients and control subjects in accordance with the Helsinki Declaration.

Clinical and laboratory parameters

The severity of psoriasis was assessed according to the Psoriasis Area and Severity Index (PASI) and body surface area. The weight, height, and abdominal circumference of subjects were measured, and their body mass index (BMI) (kg/m^2) was calculated. Systolic and diastolic blood pressure (BP) was measured after a 5-minute rest and again after a 10-minute interval, and the mean values were recorded. Data were also gathered on: age, sex, mean time with psoriasis, personal history of psoriatic arthritis or nail psoriasis, family history of psoriasis, Fitzpatrick skin type, estimate of time spent outdoors (sum of estimated hours per weekday and weekend day), tobacco (cigarettes per day), and daily and weekend alcohol intake (grams per day). C-reactive protein (CRP), erythrocyte sedimentation rate, triglycerides, high-density lipoprotein cholesterol, and glycemia were analyzed in blood samples drawn between 8 and 9 AM. Serum 25-OHD levels were determined by commercially available radioimmunoassay in the biochemistry department of our hospital. Patients were interviewed to determine their usual dietary intake of vitamin D. The amount of vitamin D intake per day was similar ($P > .05$) between the psoriasis (140 IU) and control (115 IU) groups. Intake of vitamin D supplements was an exclusion criterion. Dietary vitamin D intake was not significantly correlated with serum 25-OHD concentration ($P > .05$).

Statistical analysis

The Kolmogorov-Smirnov test was used to examine the distribution of variables and the Levene test to