Vitamin D serum level in vitiligo patients: a case-control study from Iran

Vahideh Lajevardi, MD
Mohammad Javad Nazemi, MD
Zohreh Khodashenas, MD
Mohammad-Sadegh Ebadi

Department of Dermatology, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Corresponding Author:
Vahideh Lajevardi, MD
Department of Dermatology, Razi Hospital, Vahdate-e-Eslami Avenue, Vahdat-e-Eslami Square, Tehran, Iran
Email: vahide_Lajevardi@yahoo.com

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Background: Generalized vitiligo is characterized by autoimmune destruction of melanocytes, which results in patches of the depigmented skin and the overlying hair. Vitamin D is an essential hormone synthesized in the skin and is responsible for skin pigmentation. Low vitamin D levels have been noted in patients with a variety of autoimmune diseases. A recent study showed that low vitamin D levels may be associated with vitiligo. The aim of this study was to compare 25-hydroxyvitamin D (25[OH] D) levels in Iranian patients with vitiligo with normal controls.

Method: In this case-control study, we studied 30 newly diagnosed patients with vitiligo and 30 healthy controls through a case control design. Two groups were matched for gender, age, and the season in which the serum levels of 25-hydroxy vitamin D were measured. The serum levels were categorized as sufficient, insufficient and deficient.

Result: The mean serum level of vitamin D was 10.24±1.27 ng/mL in patients compared to 18.31±7.39 ng/mL in the control group. Male patients had lower levels of vitamin D compared to controls (7.25 ng/mL vs. 13.31ng/mL, P=0.03), while no significant difference was observed between females and controls (14.12 ng/mL vs. 16.25 ng/mL, P=0.51).

Conclusion: The present study demonstrated that there may be an association between low levels of Vitamin D3 and vitiligo in men.

Keywords: melanocyte, vitamin D, vitamin D deficiency, vitiligo

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INTRODUCTION

The breakdown in immune tolerance that allows for destruction of the self-targets in autoimmune diseases has yet to be understood. However, it is hypothesized that environmental exposures, including factors that stimulate endogenous inflammation, trigger the development of autoimmunity [1]. Vitiligo is an autoimmune disease which is characterized by well-demarcated patches or macules of depigmentation in different shapes and sizes. It is caused by destruction of the functional melanocytes in the involved epidermis and the bulb/infundibulum of the hair follicle [2-4]. Vitiligo affects 1-4% of the world's population with no recognized gender or skin tone predilection [5,6].

Vitiligo is a distressing cosmetic problem, particularly in individuals with dark skin phototypes, due to the striking contrast between the lesions and unaffected skin. Therefore, it is associated with social and personal problems [7]. A variety of therapeutic agents have been described in the literature, but none has proved to be uniformly effective [8].

Vitamin D is an essential hormone that is synthesized in the skin via a photochemical reaction following the exposure to ultraviolet B (UVB) present in the sunlight. However, the synthesis can be limited and depends on the age, skin pigmentation, sunscreen use, and clothing [4].

This vitamin is actually a hormone that has some regulatory effects on the immune system. Recent evidence shows that it may be involved not only in bone and mineral metabolism, but also in the pathogenesis of many types of cancers and autoimmune diseases such as multiple sclerosis [9,10]. Recent advances in understanding of the 1,25 $(OH)_2$ D_3 function and novel insights into the its immunomodulatory properties suggest wide applicability of this hormone in the treatment of autoimmune diseases and the prevention of allograft rejection [4,11]. It plays an immuno-protective role through inhibition of the maturation of dendritic cells (DCs), shifting Th_1 to Th_2 response, inhibition of Th_{17} cells, increasing T_{reg} cells to suppress auto-attacks, and therefore maintaining self-tolerance [12]. In 2010, Silverberg et al, assessed serum 25-hydroxyvitamin D (25[OH]D) levels in 45 vitiligo patients and concluded that low levels of vitamin D may be associated with vitiligo [13]. With this background, we conducted a case-control study to compare serum vitamin D levels between Iranian patients with vitiligo and healthy people.

PATIENTS AND METHODS

Ethics Statement

The study was approved by the ethic committee of Tehran University. All participants provided their written informed consent before participation in the study.

Subjects recruitment

Over a two-year period, from January 2010 to March 2012, thirty consecutive newly diagnosed vitiligo cases were enrolled in the study. Inclusion criteria were as follows: 1) no treatment for vitiligo, 2) no oral vitamin D supplementation for at least 6 months prior to the study, and 3) no history of chronic kidney disease, malabsorption, or endocrine diseases. Similar inclusion criteria were applied for controls with the exception of the presence of vitiligo or other autoimmune diseases.

The diagnosis of vitiligo and was made by one dermatologist in the dermatology clinic of Razi Hospital affiliated to Tehran University of Medical Sciences who also collected further information from the patients. Sex, age, type of vitiligo, affected body surface area, and family history of vitiligo were recorded. Sampling was performed from the patients and controls at the same time in order to eliminate the effect of seasonal variations on vitamin D levels. Serum vitamin D levels were measured via the electrochemiluminescence method using commercial kits.

Regarding serum vitamin D levels, the subjects were categorized into three groups: normal who had vitamin D levels>30 ng/ml; insufficient who had vitamin D levels between 20 to 30 ng/ml; and deficient who had vitamin D levels<20 ng/ml. Laboratory technicians were blinded to whether the blood samples were drawn from the patients or controls.

Statistical analysis

Data analysis was performed using PASW Statistics (IBM Corp., Armonk, USA) version 18. Mean and standard deviation (SD) were used for statistical description of the data. Independent samples *t* test was used for comparison of the mean vitamin D levels between the patients and controls. Comparisons between vitamin D levels on one hand and sex, age, and time of onset of disease on the other hand were made using Mann-Whitney test. Statistical significance was set at 0.05.

RESULTS

Sixty participants were enrolled into the current study including 32 males (53%) and 28 females (47%). Mean age ± standard deviation (SD) of the participants and their mean ± SD serum levels of vitamin D have been demonstrated in Table 1.

The 25(OH)D levels were deficient in 21 patients (70%), insufficient in 6 (20%), and sufficient in 3 (10%). Among the controls, there were 20 people with deficient (66%), 4 with insufficient (14%), and 4 with sufficient (20%) vitamin D levels. The patients had a slightly lower mean level of 25(OH)

Table 1. Mean age and vitamin D levels of vitiligo and control patients

Group	Variable	Mean ± SD (ng/mL)
Vitiligo	Vitamin D	10.24 ± 1.72
	Age	30.2 ± 0.91
Control	Vitamin D	18.31 ± 7.39
	Age	34.76 ± 1.07

D and a slightly higher percentage of deficiency although they were not statistically significant.

There was no relation between 25(OH)D levels and the onset of disease before and after adjustment for sex and age (P> 0.05). Male patients had lower levels of vitamin D compared to controls (7.25 ng/mL vs. 13.31ng/mL, P=0.03) while no significant difference was observed between female patients and controls (14.12 ng/mL vs. 16.25 ng/mL, P=0.51).

The limbs were the site of disease onset in 18 (60%), trunk in 7 (23.3%), genitalia in 3 (10%), and head and neck in 2 patients (6.6%).

DISCUSSION

Consecutive patients were enrolled in this study with no gender predilection which is in line with previous studies [6]. The majority of the patients in this study were 25 to 30 years old. This finding is also in accordance with the existing reports of the age distribution of vitiligo [5].

In a cohort study, serum concentrations of vitamin D in vitiligo patients were measured and divided into three groups: 31.1% had normal (>30 ng/mL), 55.6% had insufficient (<30 ng/mL), and 13.3% had very low levels (<15 ng/mL) of serum vitamin D. Very low 25-hydroxyvitamin D levels were associated with co-morbid autoimmune illnesses but not with age, gender, race/ethnicity, family history of vitiligo or autoimmune disease, new-onset disease, or affected body surface area [13]. Their findings are in contrast with our results which showed more patients in the vitamin D deficient group and fewer patients in sufficient and insufficient groups.

In a case-control study by Xu, 25(OH)D levels showed no correlation with the development of vitiligo in Chinese patients. However, deficient 25(OH)D levels may be linked to autoimmune disorders in patients [14]. In one case report, low levels of vitamin D (equal to 12 ng/mL) were found in a vitiligo patient [15].

Despite lower serum levels of vitamin D in women, there was no statistically significant relationship between sex and serum vitamin D levels in our study. However, when compared to healthy men, serum vitamin D levels were significantly lower in male patients with vitiligo. On the other hand, there was no significant difference between serum vitamin D levels between the women in case and control groups. According to the results of this study, women in case and control groups suffered vitamin D deficiency. Lower levels of 25(OH)D in women can be explained by their less exposure to the ultraviolet rays of sunlight due to more covered areas of the skin in Iranian women [16].

Measurement of serum levels of vitamin D at the time of diagnosis of vitiligo is recommended and vitamin D supplementation is suggested for the patients with low levels of 25(OH)D. Further studies with larger sample sizes and cohort studies are recommended to investigate the effects of vitamin D deficiency and vitamin D supplementation on the incidence of vitiligo.

REFERENCES

1. Kriegel MA, JoAnn E. Manson JE, Costenbader KH. Does Vitamin D affect risk of developing autoimmune Disease?: A systematic review. Semin Arthritis Rheum 2011;35: 49-67.
2. AlGhamdi K, Kumar A. Depigmentation therapies for normal skin in vitiligo universalis. J Eur Acad Dermatol Venereol 2011;25:749-57.
3. Hartmann A, Brocker EB, Becker JC. Hypopigmentary skin disorders: current treatment options and future directions. Drugs 2004;64:89-107.
4. AlGhamdi K, Kumar A, Moussa N. The role of vitamin D in melanogenesis with an emphasis on vitiligo. Indian J Dermatol Venerol Leprol 2013;79:750-8.
5. Mosher DB. Fitzpatrick TB, Ortonne JP, Hori Y. Hypomelanoses and hypermelanoses. In: Freedberg IM, Eisen AZ, Wolff K, Austen KJ, Goldsmith LA, Katz SI. Fitzpatrick's dermatology in general medicine. New York: McGraw-Hill; 1999: 945-1018.
6. Nordlund JJ. The epidemiology and genetics of vitiligo. Clin Dermatol 1997;15:875-8.
7. Birlea SA, Ahmad FJ, Uddin RM, et al. Association of generalized vitiligo with MHC class II loci in patients from the Indian subcontinent. J Invest Dermatol 2013;133: 1369-72.
8. Osman AM, Elkordufani Y, Abdullah MA. The socio-demography and clinical profile of vitiligo in Sudan. Sudan J Med Sci 2008; 3301-7.
9. Zittermann A. Vitamin D in preventive medicine: are we ignoring the evidence? Br J Nutr 2003;89:552–72.
10. Zittermann A, Schleithoff SS, Tenderich G, et al. Low vitamin D status: a contributing factor in the pathogenesis of congestive heart failure? J Am Coll Cardiol 2003;41:105–12.
11. Van Etten E, Mathieu C. Immunoregulation by 1,25-dihydroxyvitamin D3: basic concepts. J Steroid Biochem Mol Biol 2005;97:93-101.
12. Ersoy-Evans S. Commentary: Vitamin D and autoimmunity: is there an association? J Am Acad

Dermatol 2010; 62: 942-4.

13. Silverberg JI, Silverberg AI, Malka E, Silverberg NB. A pilot study assessing the role of 25 hydroxyvitamin D levels in patients with vitiligo vulgaris. J Am Acad Dermatol 2010; 62: 937-41.
14. Xu X, Fu W, Wu W. Serum 25-hydroxyvitamin D deficiency in Chinese patients with vitiligo: a case-control study. PLoS One 2012;7:e52778.
15. Nunes JP, Martins CS. Myocardial infarction, hypovitaminosis D and vitiligo. Rev Port Cardiol 2010;29:839-40.
16. Nurbazlin M, Chee WS, Rokiah P, et al. Effects of sun exposure on 25(OH) vitamin D concentration in urban and rural women in Malaysia. Asia Pac J Clin Nutr 2013;22:391-9.

