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Can the level of vitamin D be a predictor for the risk of cutaneous lupus erythematous? Case study: Razi Hospital in 2014

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ABSTRACT

Low level of vitamin D, as an immunomodulator factor, is found in autoimmune diseases. Cutaneous lupus patients, because of exacerbation due to sun exposure, need to protect from the sun. This is while the main source of vitamin D is exposure to sunlight. The aim of this study was to evaluate the relation between cutaneous lupus and serum level of vitamin D. In a cross-sectional study, the random sample of 20 cutaneous lupus patients from Razi hospital, Tehran, Iran in 2014 and 20 people as a control group were compared for serum vitamin D levels (by matching age, sex and season). The 30% of cutaneous lupus patients had vitamin D deficiency (<10 ng/ml) and 80% had either deficiency or insufficiency (<30 ng/ml); While in the control group there was no deficiency and 60% of people had vitamin D insufficiency. The average serum level of vitamin D in patients was 20.07±12.39 ng / ml and in healthy individuals was 30.15±17.05 ng / ml. The serum level of vitamin D in patients was significantly lower than the control group (p value = 0.039).Increasing 5ng/ml vitamin D, decreased 22% the risk of cutaneous lupus. Sun protection did not change the serum level of vitamin D in patients. So it seems that vitamin D deficiency in cutaneous lupus patients is more related to the nature of the disease. In this respect, the vitamin D level measurement is recommended to be used as a screening test to prevent complications in these patients.

Key words: Vitamin D, Cutaneous lupus erythematosus, Systemic lupus erythematosus, photosensitivity

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INTRODUCTION

Lupus erythematosus (LE) is an autoimmune disease that can affect various body systems. In this disease, skin is a common involved tissue that can be as the only manifestation of lupus erythematosus or as a part of systemic situation. Cutaneous lupus erythematosus (CLE) refers to the inflammatory changes in the skin occurs following lupus erythematosus [1]. Since cutaneous lupus erythematosus exacerbates with exposure to ultraviolet radiation, the patients should strictly avoid sun exposure and use sunscreens that block UV light; However when the skin exposed to the sun's ultraviolet (UV), without regard to food sources, can provide adequate vitamin D[2].

Vitamin D has immunomodulatory functions and its deficiency has been associated with increased prevalence of immunological diseases such as lupus. Vitamin D levels correlate with the disease severity in lupus patients, although controversy has remained about data for antibody titers [3].This deficiency is seen in the other autoimmune diseases such as diabetes mellitus type I, rheumatoid arthritis and systemic lupus erythematosus and multiple sclerosis [4]. Its deficiency causes secondary hyperparathyroidism that can leads to osteomalacia, irreversible loss of bone density and increased risk of fracture [5]. On the other hand, vitamin D deficiency significantly increases the

risk of many chronic diseases such as cancer, autoimmune diseases, infectious diseases and cardiovascular diseases[2]. When exposing to UVB, 7-dehydrocholesterol is converted to cholecalciferol (pre-vitamin D3) following UV irradiation in the skin. This compound immediately changes to vitamin D3 during thermal reactions. Vitamin D2 and D3 in the food join to chylomicrons and are transferred to the venous circulation by the lymphatic system, then adhere to vitamin D binding protein and alter to 25-hydroxyvitamin D by 25-hydroxylase. 25-hydroxyvitamin D is biologically inactive, consequently converted to $1,25(OH)_2$VitD (active form) by 1α-hydroxylase in the kidney [2]. To provide the necessary serum concentrations of vitamin D, oral administration does not appear to be the best choice. In healthy people the main source of vitamin D is the skin and the second largest source is food (when food is not enriched). Conversely after oral intake of vitamin D, skin exposures with the UVB cause increases in the serum concentration of vitamin D within two weeks after the exposures [6]. It seems that vitamin D deficiency may worse the clearance of apoptotic cells in SLE patients [7]. For vitamin D, deficiency is equivalent to <10 ng / ml, insufficiency is equal to 10-29 ng / ml, Sufficiency is 30-100 ng / ml and toxic dose is > 100 ng / ml. Vitamin D acting as a multilateral regulation of biological functions, plays roles in bone health and even risk predictor of breast cancer, colorectal and prostate [4]. This led us to study the level of vitamin D in cutaneous lupus patients.

MATERIALS AND METHODS

This research was a cross-sectional study in which a random sample of 20 patients with subacute and chronic cutaneous lupus who referred to Razi Hospital in 2014 were compared with 20 healthy subjects who admitted to Razi hospital due to diseases not associated with vitamin D. Patients with at least 4 ACR criteria for SLE classification and patients with extracutaneous presentations were excluded from the study. Patients and control group were matched individually based on age, sex and season. After description of the research project and method of fill out the moral forms and questionnaires, these forms were distributed among them. The required information was collected using the questionnaire and the serum test of 25(OH) D3. The questionnaire was consisted of question including age, gender, body mass index(BMI), current smoking. The activities of Sun Protection include using of sunscreen SPF15 and above, limited outdoor activities especially from 11 am to 3 pm, using gloves, sunglasses and hat. The answers to questions were from 1 to 4 respectively. 1 means not to use and 4 means full use. The 25 (OH) D3 level measurements were performed by chemiluminescence assay (ng/ml) in a laboratory with the same equipment. The study protect was approved by ethics Committee of Tehran university.

Continuous variables were described using mean (standard deviation) and categorical variables were summarized as count (percent). Independent T test and chi-square test were used to assess the association between vitamin D serum levels and categorized vitamin D (<10 ng/ml for deficiency, 10-29 ng/ml for insufficiency and ≥30 ng/ml for sufficiency) with lupus, respectively. Linear regression model was used to estimate the adjusted mean different in vitamin D between case and control groups along with 95% confidence interval after adjustment for confounding variables (sex, age and season).

RESULTS

In this study 20 cutaneous lupus patients and 20 healthy controls (matched for age and sex) participated. 15 (75%) persons of patients were women.

Table 1:Clinical and demographic characteristics in subjects

	Case (n=20)	Control (n=20)
Age(years)	38 (13.3)	36.9 (11.9)
Sex (female) n (%)	30 (75%)	30 (75%)
BMI (kg/m^2)n (%)<25 ≥ 25&<30 ≥30	3 (15%) 10 (50%) 7 (35%)	_ _ _
Current Smoking no yes	16 (80%) 4 (20%)	_ _
Vit D level(ng/ml)	20 (12.3)	30.2 (17)
Using vit D supplement	9 (45%)	_
Photoprotection 1 (without protection) 2(low protection) 3(high protection) 4 (complete protection)	5(25%) 10(50%) 5(25%) 0%	_ _ _ _

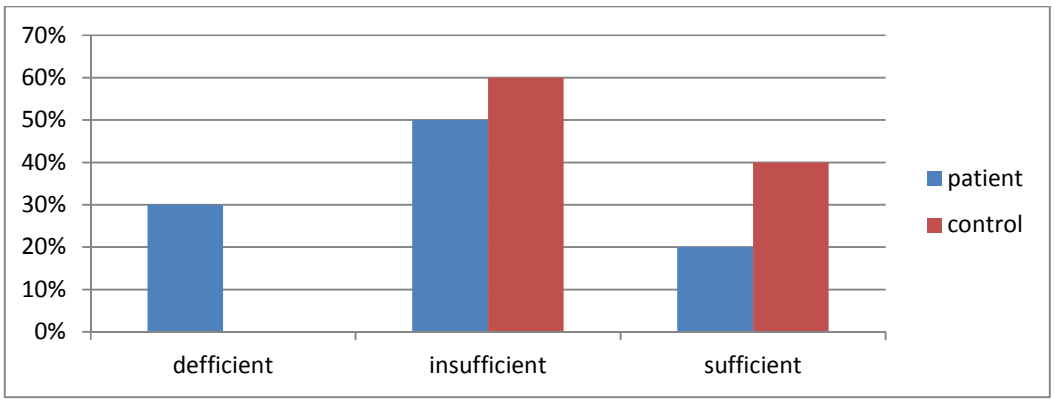

Figure 1: Frequency distribution of the categorical vitamin D in study subjects

Six (30%) of cutaneous lupus patients had vitamin D deficiency (<10ng/ml) and 80% of patients had either deficiency or insufficiency (<30 ng/ml). While in the control group there was no subject with vitD deficiency,60% of people had insufficiency.

The mean serum level of vitamin D in patients was 20.07ng /ml with a standard deviation of 12.39 and in healthy individuals was 30.15ng /ml with a standard deviation of 17.05. So the mean difference between cases and control groups after adjustment (95%CI) was 10.08 ng/ml (p-value = 0.039).

Base on logistic regression model, the odd ratio between vitD and lupus decreased by 22% (95%CI) per 5ng/ml increase in vitD (OR=78%).On this basis by increasing 1ng/ml of vitamin D, the risk of cutaneous lupus is 0.95. In other words it reduced risk of lupus 5%. This amount became more obvious by changing 5ng /ml of vitamin D so that the probability of cutaneous lupus became 0.78 and it decreased the risk of lupus 22%.

In patients with low sun protection (1, 2) average level of vitamin D was 22.6 (SD=12.89) respectively and in patients with high sun protection (3.4) average level of vitamin D was 14.10 (SD=9.40) respectively. Relation between sun protection and vitamin D levels was not statistically significant (p-value = 0.22). Vitamin D level averages in female cutaneous lupus patients were 18.36 (SD=12.76). For The men patients these amounts were 25.2 (SD=10.75) respectively. On this basis levels of vitamin D in women are less than men but differences in vitamin D levels between cases and control groups were more prominent in men than in women. So the average level of vitamin D in man control group and man patients was 41.80 and 25.20 respectively (difference 15.6) and for female patients and female peoples in control group these amounts were 18.36 and 26.26 respectively (difference 8.7).

Among male patients 60% gained points 1 and 40% gained points 2, while 13.3% of women patients gained points 1, 53.3% gained points 2 and 33.3% gained points 3. No significant association was found between gender and protection from the sun (p-value = 0.079).

In terms of Medical drugs uses, 80% of patients (n=16) treated with prednisone, 50% of patients (n=10) treated with calcium D and 30% of patients (n=6) were treated with hydroxychloroquine. The average level of vitamin D in patients receiving vitamin supplement was 29.45 and in patients without taking supplements was 15.03.

Average vitamin D levels and standard deviation in smoker patients were 21.52 and 19.71 respectively and in non-smoking patients were 19.71 and 11.50 respectively. Between the two groups of patients in vitamin D levels there was no significant difference (p-value = 0.8).

DISCUSSION

In this study 30% of patients had vitamin D deficiency, 50% have insufficiency and 20% have sufficient vitamin D. This is while in the control group severe deficiency of vitamin D was not observed, 60% have insufficiency and 40% have sufficient vitamin D. This finding is consistent with previous studies which showed vitamin D deficiency

in cutaneous lupus patients was more common than in the normal population [8].A systematic review showed in most studies that have shown no correlation between vitamin D and lupus, its statistical detail was not provided. This is while that at 11 studies and in this study weak inverse correlation between these two cases have been shown [9]. Marco et al. study showed the history of cutaneous lupus is a strong predictor of vitamin D inadequacy [4]. In comparison, according to the Renne et al. research no relationship between vitamin D levels and parameters associated with other diseases such as lupus severity index (According to the European Association index), antibody and complement has been found [10].

We found no statistically significant difference between serum vitamin D and smoking (p-value = 0.884) or age (p-value = 0.93).These findings are incompatible with recent study in which aging is associated with a greater percentage of vitamin D deficiency [8].

Serum vitamin D levels in patients using vitamin D supplements are amounts (mean 26.56, SD 12.66) and in patients who didn't receive vitamin D supplements are amounts (mean 14.76, SD 9.74). Accordingly difference in vitamin D levels between the two groups was statistically significant (p-value = 0.03).

Protection from the sun was evaluated with a score from 1 to 4 (1 lack of protection, 2 low protection, 3 high protection and 4 complete protection). Between sun protection and serum vitamin D level was not statistically significant (p-value= 0.67).These findings are consistent with a recent study in which no significant difference on vitamin D levels in the various groups (1-2 compared to 3-4) although significant level further is in the using of shadow [14]. While the study of Cusack and colleagues low levels of vitamin D was observed in people who avoid the sun (p-value = 0.004) and sunscreen consumers (p-value = 0.042) [11].

It appears that vitamin D deficiency in SLE patients is more associated with the nature of the disease compared to activities to protect them from the sun. In this respect, it is recommended that measurement of the vitamin D be used as a screening test to prevent complications in these patients. Also interventional studies with larger sample size are recommended to be done in this regard for closer examination.

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Declaration of interest
There is no conflict of interest for this work.

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