ORIGINAL ARTICLE

Vitamin D levels and atopic dermatitis. Is there a link?

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ABSTRACT

Background: Contradictory findings have been published on the association between atopic dermatitis (AD) and vitamin D (vit D) levels.

Objective: The aim of this study was to examine the relation between serum 25-hydroxyvitamin D concentration (25(OH) D) and AD and to establish whether vit D supplementation would result in better clinical improvement or not.

Subjects and Methods: This study was conducted from April 2017 to May 2018 in Al Dar Hospital, Al-Madinah, KSA. Sixty patients who were diagnosed as atopic dermatitis were recruited. Patients were investigated for an objective Severity Scoring of Atopic Dermatitis (SCORAD) index, serum 25 hydroxyvitamin D concentrations. Patients who were found to have low serum 25 hydroxyvitamin D were then divided into 2 groups, one group was given only topical treatment of atopic dermatitis (emollients, topical corticosteroids) and the other group was given the same topical treatment with addition of vit D supplementation, then SCORAD index and serum vit D were assessed again after 3 months.

Results: Patients were classified according to SCORAD index into mild (n=25, 41. 6%), moderate (n=21, 35%) and severe atopic dermatitis (n=14, 23.3%). The serum 25-hydroxyvitamin D concentration was (19.48+6.57ng/ml), (18.7+6.25ng/ml), (18.5+5.9ng/ml) in patients with mild, moderate and severe atopic dermatitis, respectively. Vitamin D supplementation didn't result in an added significant reduction in SCORAD index in comparison to only topical treatment of atopic dermatitis.

Conclusion: This study suggests that vitamin D insufficiency is common among patients with atopic dermatitis. Lower vitamin D levels are not associated with the severity of atopic dermatitis. Vit D supplementation doesn't change AD severity significantly. Vitamin D deficiency with AD may be an association or a result of impaired skin functions.

KEYWORDS: Atopic dermatitis, SCORAD index, Vitamin D

INTRODUCTION

Atopic dermatitis is a multifactorial disease. Role of vit D deficiency in atopic patients has been discussed but still there's a controversy. In addition to classical role of vit D in calcium homeostasis, studies demonstrate the influence of vit D in immunomodulation and cell differentiation. It is, furthermore associated with keratinocyte production of antimicrobial peptides.[1]

Vit D can be obtained from dietary sources, however the biggest contribution to an individual's circulating levels of vit D is through endogenous production in the skin following exposure to ultraviolet (UV)-B radiation from the sun. The serum levels of 25(OH) D are measured as a marker of vit D status due to its long half-life (~15 days). 25(OH) D represents the reservoir available for production of the active

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form 1, 25(OH) 2 D which is produced, primarily in the kidney.[2] This study was performed as a trial to identify the relation between vit D and AD. Vit D level in the blood may be causative factor in the pathogenesis of AD or result of impaired skin functions in atopic patients.

SUBJECTS AND METHODS

SUBJECTS

The study involved sixty patients, 28 females and 32 males, mean age 8.7 ± 3.2 years (range 6 months - 14 years), diagnosed to have AD according to Hanifin's and Rajka's criteria. The patients were recruited from pediatric and dermatology outpatient clinics of Al Dar hospital Al madinah, KSA during period from April 2017 to May 2018. After the parents had received verbal and written information about the aim of the study, written informed consent was obtained. Patients were not receiving any medical treatment for atopic dermatitis, vitamin D or calcium supplements in their diet in the previous 3 months.

METHODS

We examined the patients using SCORAD index to assess the severity of AD. Patients were classified as mild (< 25), moderate (25–50) or severe (> 50). Baseline serum 25-hydroxyvitamin D measurement was done for each patient. To study effect of vitamin D supplementation on atopic dermatitis, patients who had insufficient or deficient vit D were divided into 2 groups, the first group was treated only topically, and the second group was given oral vit D supplementation in addition to topical treatment. Oral vit D supplementation was given depending upon the level of deficiency and age (6000 IU of cholecalciferol daily in ages 1-12 years; 10,000 IU daily for 12-18 years of age) according to the British National Formulary (British Medical Association and Royal Pharmaceutical Society of Great Britain 2011). After 3 months SCORAD index, serum 25 (OH) D were measured again for all patients of both groups.

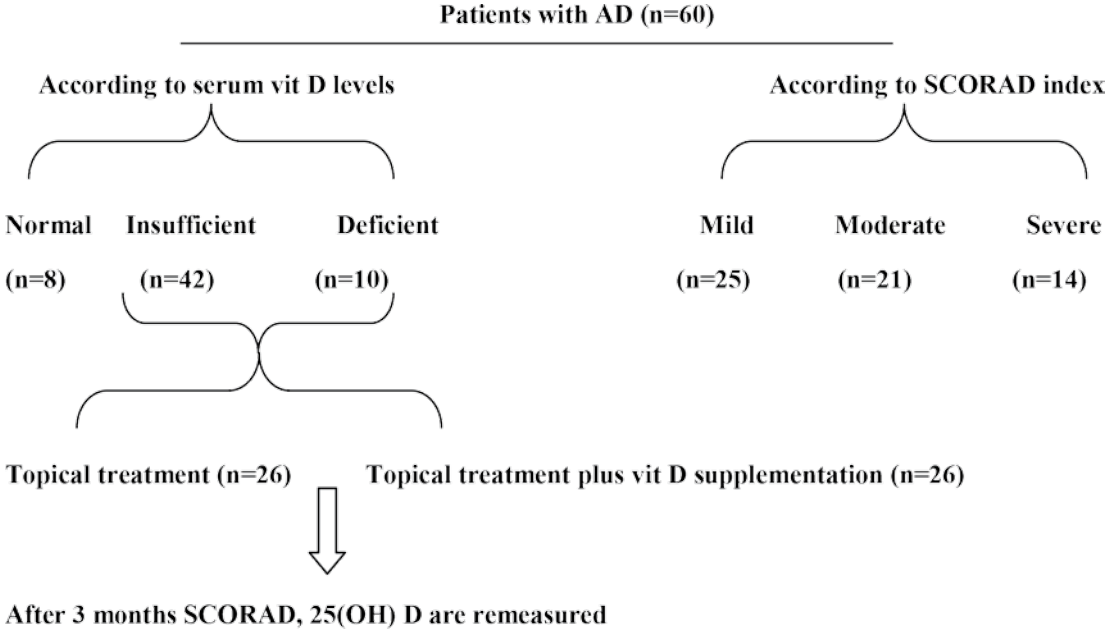

Figure1. Flowchart of the study

STATISTICAL ANALYSIS

Independent t-tests were used for comparison of vit D levels and SCORAD scores between patients. Correlations among variables were investigated with the Pearson's correlation coefficient. Among groups presenting with different AD severity as determined with the SCORAD index, a comparison of vitamin D levels was performed with ANOVA. P-values ≤0.05 were considered statistically significant.

RESULTS

Using SCORAD, patients included in the study were classified into three groups, mild AD (18.44+1.19, n=25), moderate AD (35.85+4.04, n=21) and severe AD (58.14+4.36, n=14). Serum concentration of 25(OH) D, >30ng/ml, 10-30ng/ml, <10ng/ml was defined as sufficient, insufficient and deficient, respectively. In this study Vit D levels showed negative correlation with SCORAD scores but with no statistical significance (Pearson's correlation coefficient r= - 0.0765, p>0.05) as shown in Fig. 1. Also, 25(OH)D levels were found sufficient, insufficient and deficient in 8 patients (13.3%), 42 patients (70%) and 10 patients (16.6%), respectively. Mean serum vit D levels were found to be 19.48+6.57ng/ml, 19+6.25ng/ml, and 18.5+5.9ng/ml in mild, moderate and severe AD cases, respectively (no statistically significant difference, p=0·87, Table1). Vit D levels showed negative correlation with SCORAD index but with no statistical significance (Fig. 2, p>0.05, r= - 0.0765).

Fifty two patients out of total sixty patients had insufficient or deficient serum Vit D levels. They were divided into two groups: first group (n=26) was treated with only topical therapies and second group (n=26) was treated with Vit D supplements plus topical therapies. Mean serum vit D showed no significant change in the first group from 20.2±7.9ng/ml to 20.4±5.3ng/ml (p>0.05, unpaired t test, Table 2) while in the second group, a significant two folds increase after 3 months of Vit D supplementation from mean level 17.9±3.9 ng/ml to 35±2.6ng/ml, however remained within normal range (30-100ng/ml) (p<0.0001, unpaired t test, Table 2). Both groups displayed significant reduction of SCORAD severity after three months (topical treatment =38.9% SCORAD reduction from 36.4±3.79 to 22.1±3.21; with added Vit D supplementation= 39.8% SCORAD reduction from 42.49±2.51 to 25.28±1.92; paired t-test), with no statisical significant difference between both groups (p=0.3853, Table 2).

Table 1 Patient characteristics

Characteristic	Results
Mean age (years)	8.7 ±3.2 (6 months-14 years)
Sex (male/female)	n= 32/28
SCORAD score Mild <25 Moderate 25-50 Severe >50	 n= 25/60 n= 21/60 n= 14/60
Mean serum vitamin D (ng/ml) Sufficient ≥30 Insufficient 21-30 Deficient ≤2	 n= 8 /60 n= 42/60 n= 10/60

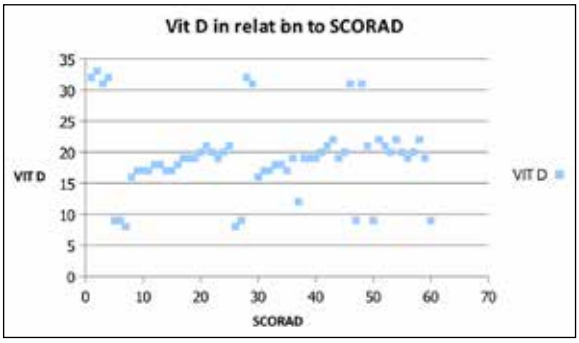

Fig. 1 Correlation between Vit D levels and SCORAD scores Vit D levels.

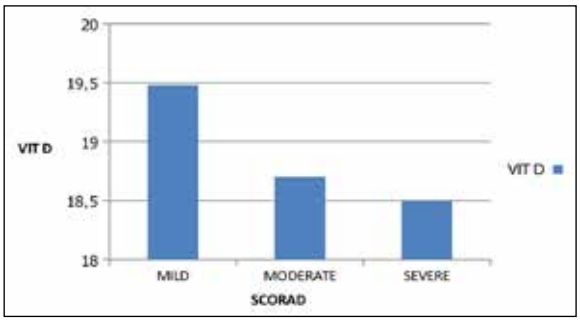

Fig. 2 Vit D level in patients according to SCORAD score.

Table 2 Effect of treatment on SCORAD and Vit D levels

Group	Topical treatment only (n=26)		Added Vit D supplementation (n=26)	
	SCORAD	Vit D	SCORAD	Vit D
Before treatment (m±SD)	36.4±3.79	20.2±7.9	42.49±2.51	17.9±3.9
After 3 months (m±SD)	22.1±3.21	20.4±5.3	25.28±1.92	35±2.6
t	14.68	0.1072	27.76	18.602
p value	0.0001	0.9151	0.0001	0.0001

Both groups showed significant reduction of SCORAD scores after 3 months therapy (topical therapy only =38.9% SCORAD reduction mean of 38.9±5.7 from 36.4 ± 3.79 to 22.1 ± 3.21; (p <0.0001, paired t- test); Vit D supplemented group =39.8% mean 39.8±3.5 SCORAD reduction from 42.49 ± 2.51 to 22.28 ±1.92; (p <0.0001, paired t- test). Fig. 3. Mean SCORAD reduction in topical therapy group 38.9±5.7 and Vit D supplemented group 39.8±3.5, did not show statistical significant difference (p=0.495,unpaired t test). Fig. 4.

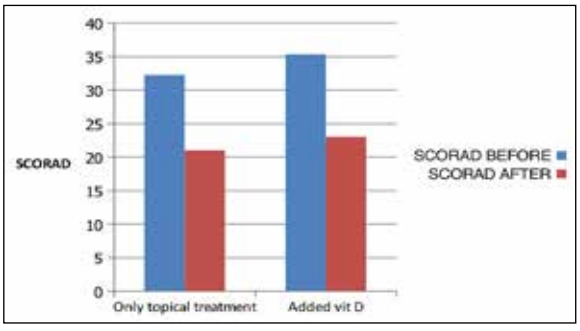

Fig. 3 SCORAD scores before and after treatment.

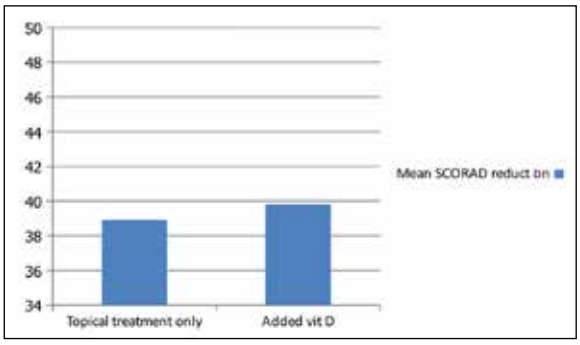

Fig. 4 Mean SCORAD reduction before and after treatment.

Vit D after 3 months therapy, topical treatment group showed insignificant change from 20.2±7.9 to 20.4±5.3, p =0.92, unpaired t-test); Vit D supplemented group showed significant change from 17.9±3.9 to 35±2.6; p <0.0001, unpaired t-test). Fig. 5.

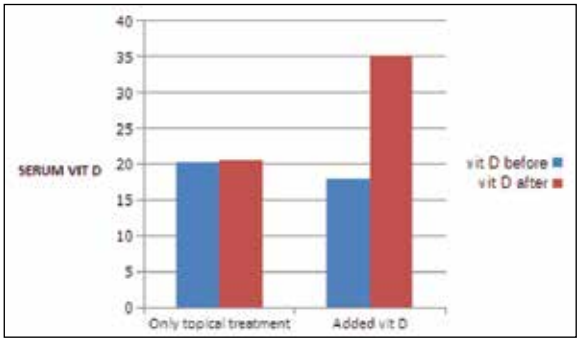

Fig. 5 Vit D levels before and after treatment.

DISCUSSION

The relationship between Vit D and allergic diseases as atopic dermatitis, asthma, allergic rhinitis and allergic conjunctivitis is still unclear. Sometimes Vit D is considered a protective factor, sometimes a risk factor for AD. The aim of this study was to determine relation between Vit D and atopic dermatitis and to examine if supplementation with Vit D can affect AD clinical presentation or not.

The current study revealed low Vit D levels among atopic dermatitis patients but with weak /non significant negative correlation between

serum 25(OH)D and severity of the disease as evaluated by the SCORAD index. Our results go with that reported by Felicia Montero *et al*[3] who found no relation between serum Vit D and allergy markers as IgE. However, Jae-Won Oh[4] reported, that vitamin D affects B lymphocyte functions and modulates the humoral immune response including secretion of immunoglobulin E (IgE).

The recruited patients given Vit D supplementation didn't show statisticaly significant difference in reduction of SCORAD index when compared with patients who were treated with only topical treatment; therefore Vit D may not have a direct causative effect on AD. Also patients who were treated with only topical treatment showed no significant change in serum Vit D levels; this may indicate that the decrease in serum Vit D is not a result of AD.

However, there are many controversies. Despite the positive association between hypovitaminosis D and increased prevalence or severity of AD demonstrated in some studies, several other authors have found an inverse association. Thuesen *et al* found no significant associations of 25(OH)D with atopy and concluded that 25(OH)D levels do not influence the development of asthma and allergy.[5]

Observational data on Vit D and eczema is mixed. Some studies show low 25(OH) D levels are associated with less eczema and some studies show the opposite. Heimbeck *et al* found that in children and adolescents, higher vitamin D levels were associated with a higher prevalence of eczema in their study population in Germany.[6] Unexpectedly, children with the very lowest levels, (< 8 ng/ml) had significantly less eczema.

Bäck *et al* showed that the increased intake of vitamin D during childhood correlates with an increased risk of AD at 6 years of age.[7] AD was more prevalent in the group with the highest intake of Vit D3, regardless of family history of atopy. Breastfeeding in the first four months of life was shown to reduce the risk of childhood eczema at 4 years of age.[8] Breastfeeding usually implies in low intake of Vit D3, while replacement with infant formula and dairy drinks with cereal are fortified with Vit D3, providing a considerably higher intake. Corroborating this association, Milner *et al*[9] demonstrated that early infant multivitamin supplementation (in the first 6 months of life) was associated with an increased risk of food allergies and asthma in black children. A large cohort study in Finland showed that Vit D supplementation during the first year of life was associated with a higher prevalence of atopy and allergic rhinitis at 31 years of age.[10] Children whose mothers had increased serum levels of 25(OH)D had a higher risk of eczema at 9 months and asthma at 9 years old.[11]

CONCLUSION

Vit D insufficiency is common among our AD patients. Lower vitamin D levels are not associated with AD severity. Vit D supplementation doesn't change AD severity. Vit D deficiency with AD may be just an association and the relation is in need to be more investigated to be clarified.

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