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Original Article

Dermatology Section

Correlation of Vitamin D3 Levels and SCORAD Index in Atopic Dermatits: A Case Control Study

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ABSTRACT

Introduction: Atopic Dermatitis (AD) is a common chronic inflammatory condition characterized clinically by pruritus and eczematous lesions. An inverse relationship has been suggested between serum 25-hydroxyvitamin D concentration and severity of atopic dermatitis.

Aim: We carried out this controlled cross- sectional study to evaluate the association between the serum vitamin D_3 levels and SCORAD index.

Materials and Methods: For this study, 40 patients with clinical diagnosis of AD based on UK diagnostic criteria were enrolled and 40 patients with minor ailments like superficial bacterial, fungal or viral infections and not suffering from atopic dermatitis were taken as controls. Salient presentations were recorded in a pre-set proforma. Serum 25-hydroxyvitamin D levels were determined through Sandwich-ELISA technique. SCORAD (Scoring AD) index was used to evaluate the severity of the disease.

Results: Mean value of serum 25-hydroxyvitamin D levels in cases was 30.38 nmol/l whereas in controls, it was 53.46 nmol/l. The decrease in serum levels in cases was statistically highly significant (p-value <0.001). Mean±S.D of serum vitamin D levels in mild disease was 33.29±5.89 nmol/l, in moderate disease was 31.52±6.04 nmol/l and in severe form of disease was 21.24±3.17nmol/l. The correlation between SCORAD and serum 25-hydroxyvitamin D levels was also statistically significant.

Conclusion: The data suggests an inverse relationship between serum levels of vitamin D_3 and the SCORAD Index.

Keywords: Hypertension, Nutritional deficiency, Oedema

INTRODUCTION

AD is a chronic relapsing eczematous skin disease characterized by pruritus and inflammation and accompanied by cutaneous physiological dysfunction [1]. Vitamin D deficiency is the pandemic and most under-diagnosed and under-treated nutritional deficiency in the world [2]. Vitamin D maintains the integrity of the permeability barrier, can stimulate or inhibit keratinocyte differentiation and stimulate synthesis of proteins such as filaggrin that are necessary for formation of stratum corneum barrier [3]. Statistics have shown a rising trend in the occurrence of AD in India in last four decades. Studies shows that vitamin D plays a role in AD pathogenesis mainly through its immunomodulatory action [4]. Most of data related to AD is available from hospital based studies [5]. SCORAD is a clinical tool used to assess the extent and severity of eczema [6].

Peroni DG et al., found that vitamin D deficiency may be related to the severity of atopic dermatitis [7]. Han TY et al., conducted a study on 72 Korean childrens and adults it was found that serum-25 hydroxyvitamin D concentration was not significantly correlated with AD severity [8].

Our study was a hospital based controlled cross-sectional study, a first of its kind in north western region of India. The aim of this study was to investigate the correlation between serum 25-hydroxyvitamin D {25(OH)D3} levels and SCORAD Index.

MATERIALS AND METHODS

It was a controlled cross-sectional study conducted in the Department of Dermatology after taking approval from ethical committee. Eighty patients of either sex between age group of 2 to 18 years attending the outpatient department of skin and STD were enrolled. The study was conducted between the months of June 2016 to November 2016. These patients were divided into 2 groups, where, in group A, 40 patients of AD were taken according to the UK refinement of the Hanifin and Rajka diagnostic criteria [9] for atopic eczema and in group B, 40 patients of same age group were taken attending Skin and STD department with minor ailments like superficial bacterial, fungal or viral infections and not suffering from AD. Patients with any chronic dermatitis other than atopic dermatitis, patients with chronic medical illness like diabetes mellitus, hypertension and tuberculosis, patients with current consumption of vitamin D (within two months), patients receiving concomitant treatment with the ability to influence vitamin D3 and patients suffering from bowel disease with malabsorption of vitamin D3 were not included in the study groups.

Physical and dermatological examination was done for every patient. The detailed history (age, sex, occupation, residence, total duration of disease, associated itching, seasonal variation, asthma, allergic rhinitis, atopy and family history of AD) was recorded in a proforma. The blood samples of all the cases and controls were assessed on the same day.

The SCORAD index includes the assessment, by a physician, of objective signs (extent and intensity) and of subjective symptoms (pruritus and sleep disturbance) compiled on an analogue scale by the parents. Extent was calculated using the “rule of nine” and expressed the skin surface area involved. In the intensity criteria, erythema, oedema/papulation, oozing/crusts, excoriations, lichenification, and dryness of involved skin (from 0 to 3 points for each item) were evaluated. The final score was then calculated using the following equation: A/5 + 7B/2 + C (A = extent; B = intensity; C = subjective symptoms). The SCORAD index range lies between 0 and 103 [10]. The severity of the disease was evaluated using SCORAD index as mild <25, moderated 25-50, and severe >50 as defined in previous studies [11]. After routine investigations, Serum

25-hydroxyvitamin D levels were estimated using Sandwich-ELISA technique.

STATISTICAL ANALYSIS

The findings thus obtained were analysed to study the correlation between severity of AD and serum vitamin D3 levels. Categorical variables was presented as absolute numbers and percentages. The observations were tabulated in the form of mean±SD and analysed using Chi-square test, t-test for intergroup comparison, Anova test and Post-Hoc test for intra-group comparison. Comparison and level of significance was determined as its p-value with p>0.05 as insignificant, p<0.05 as significant and <0.001 as highly significant. Correlation between serum vitamin D3 levels and SCORAD score was computed.

RESULTS

Demographics

The median age in the cases was 4.92±2.99 years. The mean age of onset in the cases was 1.41±1.51 years. There were 19 and 23 males among case and control respectively.

History of Other Atopic Disorders and Family History

Out of 40 patients diagnosed with atopic dermatitis, 29 (72.5%) had history of allergic rhinitis and bronchial asthma.

Diseases in Controls

In our study, out of 40 control patients with minor superficial infections, 12(30%) had scabies, 11(27.5%) had molluscum contagiosum, 6(15.0%) had tinea and 2(5.0%) had warts. There was one patient each of milia, corn, dhat syndrome, nevus of ota, post inflammatory hyperpigmentation and pityriasis versicolour.

Mean Value of Vitamin D in Cases and Controls

The mean value of vitamin D3 in cases and controls was 30.38±6.82 nmol/l and 53.46±6.12 nmol/l respectively. The p-value (<0.001) was highly significant.

Correlation of Serum Vitamin D_3 levels with Severity of AD

The p-value of comparison between both, mild and severe disease and moderate and severe disease evaluated through post-hoc test was statistically highly significant as shown in [Table/Fig-1].

Variable	Level 1	Level 2	Level 3	p-value	Level 1	Level 1	Level 2
	(mild)	(moderate)	(severe)		vs 2	vs 3	vs 3
	(n=9)	(n=25)	(n=6)		p-value	p-value	p-value
Vitamin D3	33.29±	31.52 ±	21.24	0.001**	0.708	0.001**	0.001**
	5.89	6.04	± 3.17				

[Table/Fig-1]: Correlation/comparison between serum vitamin D3 levels and severity of AD in study cases.
**p<0.001; Highly significant

Correlation of SCORAD and Vitamin D3:

Correlation coefficient (r-value) was used for determining the relationship between SCORAD and vitamin D3 levels. The r-value was -0.458 and the p-value was 0.003. Therefore, the correlation between SCORAD and Vitamin D levels was found to be significant.

DISCUSSION

Our study demonstrated a significantly inverse co-relation between serum 25-hydroxy vitamin D3 levels and SCORAD Index (r-value= -0.458, p-value= 0.003). The mean serum levels of serum vitamin D were significantly lower in patients with atopic dermatitis as compared to controls with superficial bacterial, fungal and viral infections. The levels were deficient in patients of atopic dermatitis (< 20 ng/ml) whereas they were insufficient (20–29 ng/ml) in controls with superficial infections. The mean serum levels in case of severe atopic dermatitis were significantly lower than in patients with mild and moderate disease.

MA El Taieb et al., found that there was significant difference in the mean values of vitamin D between children with AD (5.4±1.9 ng/ml) and the controls (28.9±2.4 ng/ml) [12]. Vitamin D deficiency is defined as 25(OH)D< 20 ng/ml, insufficiency as 20–29 ng/ml and sufficiency as ≥30 ng/ml [10]. Datta S et al., also found significantly lower values of serum vitamin D in the cases (25.16±5.58) as compared to those in controls (32.39±5.28; p-value 0.001) [13].

In our study, a significantly negative co-relation between serum vitamin D3 levels and SCORAD score was observed. This finding was in consistence with a study conducted by Oren E et al., in a case-control study of 290 obese patients where the correlation between SCORAD and Vitamin D was also found to be significant [14]. These findings are in consistence with a study conducted by Akan A et al., where he observed a negative correlation between SCORAD score and serum vitamin D level [15]. Chiu YE et al., conducted a study on 94 subjects and found that the correlation between serum 25-hydroxyvitamin D concentration was not significantly correlated with AD severity [16].

LIMITATION

Sample size was small. Sun exposure and body mass index in cases and controls was not assessed. Therefore, more studies are needed with larger sample size.

CONCLUSION

We observed that serum vitamin D levels were lower in patients with atopic dermatitis as compared to controls and there is an inverse relationship between serum vitamin D3 value and severity of AD. This is suggestive of role of vitamin D3 in the aetiopathogenesis of AD. With the better understanding of role of vitamin D3 in aetiopathogenesis and treatment of this therapeutically challenging condition, newer therapeutic modalities can be developed.

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