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Is Atopic Dermatitis More Severe in Children with Lower Levels of 25-Hydroxy Vitamin D?

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Abstract

Background: Atopic Dermatitis (AD) is the most common chronic skin disease, which can lead to some complications in adulthood. According to the possibility that some environmental factors like vitamin D are effective in AD, this study was conducted to clarify the effect of serum level of vitamin D on it.

Methods: This study was performed as a case-control study, in Hamadan University of Medical Science, comparing the serum level of vitamin D in 20 children with and 20 children without atopic dermatitis. Atopic dermatitis was confirmed by standard criteria of Hanfin Verajka and the severity score was assessed using the SCORAD scoring system. Data was analyzed using SPSS software.

Results: In this study, no significant differences were found in age, gender and place of residence between two groups. And, there was no significant difference in serum level of vitamin D between two groups (P-value: 0.394) but a significant, direct relationship was observed between disease severity and serum levels of vitamin D (P-value: 0.0431).

Conclusion: The results of this study showed that vitamin D deficiency alone may not trigger atopic dermatitis, but it can worsen the disease, so it seems that the serum level of vitamin D in children with atopic dermatitis should be checked and in case of deficiency, a supplement should be prescribed.

Key Words: Atopic dermatitis, Deficiency, Vitamin D.

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1- INTRODUCTION

Atopic Dermatitis (AD) is the most common chronic skin disease (1-3), which often begins in infancy and usually in the first year of life (4). Although the severity of the disease decreases with age, adults who have had atopic dermatitis in their childhood are prone to problems such as dry skin, occupational skin disease, skin infections, and eye problems that can Increase the likelihood of future communication problems (5).

The prevalence of AD is reported to be between 7-25% and it has become a major global problem (6). AD is more prevalent in Easterners and Caucasians. On the other hand, the prevalence of this disease is growing. Some theories about this increasing prevalence include increasing the allergens in the environment and reducing the resistance of the digestive system of children to these allergens. The promotion in socio-economic status of high-income families increases the obsessive-compulsive-like behavior of the mothers in child care, which leads to a reduction in children's gastroenteritis and insufficient development of the child's gastrointestinal tract immune system against environmental allergens (7).

The main causes of the disease are unknown. Various studies consider this disease to be a multifactorial disease and In addition to genetic factors, several environmental factors are implicated in its creation (6, 7). In other words, part of this disease is inherited and the other part is related to the overactivity in the immune system (8). Immune system itself is affected by both inheritance and the environment. One of the environmental factors is vitamin D. The rationale for this thought is to identify the potential role of vitamin D in modulating immune responses. Discovery of vitamin D receptors in macrophages, dendritic cells, active B and T lymphocytes, simultaneously with the discovery of the role of 1 and 25 hydroxy vitamin D in the proliferation, differentiation and function of these cells and the presence of vitamin D receptors in many cells, including immune cells (9, 10), shows its effects on immunological system. Furthermore, vitamin D correlates with the proteins that affect the function of the skin barriers (11). So vitamin D can play a role in both immunological and structural areas. Therefore, in this study, we aimed to evaluate the possible relationship between vitamin D deficiency and the severity of atopic dermatitis by examining vitamin D levels in people aged 6 months to 18 years.

2- MATERIALS AND METHODS

This research was performed as a case-control study, in 1397-1398 in Hamadan University of Medical Sciences. The sample size was determined using the parameters of the study of Sharma et al. (12), and 20 patients with atopic dermatitis as the case group and 20 non-patients as the control group entered the study, using convenience sampling. The study number is 9806264635.

The study population included patients with atopic dermatitis between 6 months to 18 years, referred to the subspecialty clinic of asthma and allergy of Besat Hospital in Hamadan (for patients) and the healthy group of patients were those who referred for other diseases except atopic dermatitis, to the pediatric clinic of this Hospital.

Patients with a history of using vitamin D supplementation or its topical form, or patients with a history of using a drug that interferes with the absorption and metabolism of vitamin D and patients with liver, kidney, and endocrine diseases that may affect vitamin D levels, were excluded from the study.

Atopic dermatitis was confirmed by a pediatric asthma and allergy specialist according to the standard criteria of Hanfin Verajka, and the healthy group was matched with the case group in terms of

age, sex and place of residence. Demographic information of patients in both groups was recorded. The severity of atopic dermatitis in the case group was also determined by the researcher using the SCORAD scoring system. SCORAD is a tool for measuring the severity of DA, and rates the DA based on the levels of (A), severity (B) and mental scales (C) like itching and insomnia. A score less than 25 is considered as mild dermatitis, 25-50 moderate dermatitis and above 50 severe dermatitis (13).

Also, to measure the serum level of vitamin D, 3 ml of intravenous blood was taken from all participants and the serum level of 25 hydroxy vitamin D was measured using the standard DIA source kit and ELISA method. According to the kit guidelines and new studies, vitamin D concentrations of less than 10 ng / ml were considered severe deficiency, 10 to 30 as deficiency, 30 to 100 as normal, and above 100 ng / ml as toxic levels. Then the data was analyzed using SPSS 16 software. According to an abnormal distribution of data, Mann-Whitney test was used to compare the vitamin D levels between case and control groups; and Kruskall-Walis test was used to evaluate the significant differences in vitamin D levels in different severity scores in the case group. The level of statistical significance was considered Less than 5%.

3- RESULTS

The present study is a case-control study in which 20 children with AD and 20 without AD participated as case and control groups, respectively.

Gender ratio was equal in both groups (60% male and 40% female). Also there was no significant difference between the two groups, in terms of urban and rural housing (P = 0.744).

The mean age of the case group was 6.9± 5.2 years and the control group was 7.1± 4.7 years and there was no significant difference in age between two groups (P = 0.758).

The mean severity of atopic dermatitis in patients using SCORAD was 37.4 ± 18.4.

The severity of the disease in 7 patients (35%) was mild, in 10 patients (10%) was moderate and in 3 patients (15%) was severe (**Fig. 1**).

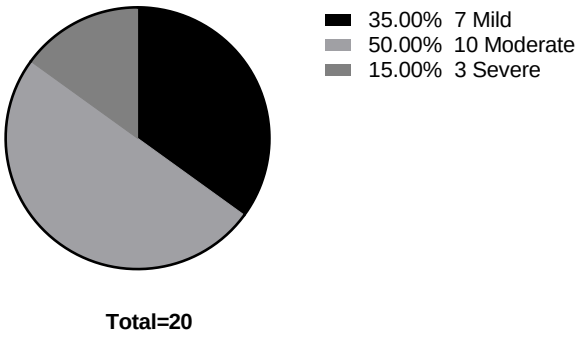

Fig. 1: Frequency of severity of Atopic Dermatitis in the case group

The mean serum level of vitamin D in the case group was 26.7± 12.4 ng / ml and in the control group was 31.8 ± 17.1, and there was no significant difference between the two groups (P-value: 0.394) (**Table 1**).

Based on the results of this study, a significant relationship was observed between disease severity and serum levels of vitamin D (P value: 0.0431) (**Table 2**).

Table-1: Comparison of mean serum levels of vitamin D between casas and controls

Group	μ	SD	P (Mann-Whitney)
Case	26.7	12.4	0.394
Control	31.8	17.1	

Table-2: Mean serum levels in the case group based on disease severity

Severity of disease	μ	SD	P(Kruskal-Wallis)
Mild	35.2	16.1	0.0431
Moderate	24.2	6.6	
Sever	15.3	3	

4- DISCUSSION AND CONCLUSION

In this case-control study, which was conducted to evaluate the relationship between vitamin D levels and the severity of atopic dermatitis, 20 children with AD as the case group and 20 children without AD as the control group were participated. The two groups were similar in terms of gender ratio and settlement in urban or rural areas. According to the scores, all three mild, moderate and severe spectrums of the disease were present in the case group.

In our study, no significant difference was observed between serum vitamin D levels in case and control groups. This was also confirmed in the study by Su et al. in Turkey in which the level of vitamin D in the case and control groups was not significantly different (14). However, in the study of Cheon et al. in South Korea (15) and the study of Sharma et al. in India (12) and also in the study of D'Auria et al. in Italy, even after matching in terms of age, sex and season (16), vitamin D levels differed between the two groups, significantly. Moreover, Navarro et al. supports the effect of vitamin D on the skin diseases, including AD, and emphasizes on measuring and correcting its deficient serum level in these patients (17).

Also, based on the results of this study, a significant relationship was observed between the severity of the disease and serum levels of vitamin D, which was shown in Cheon et al. (15), Dogru (18), Sharma et al. in India (12) and Lara-Corrales et al. (19) and Wang et al. (20). However, the study by D'Auria et al. in Italy (16) and that of Han et al. in Korea (21) did not show a significant relationship between disease severity and serum vitamin D levels; and Noha et al. has shown that receiving vitamin D resulted in better outcomes in term of mean eczema area and severity index score in mild and moderate atopic dermatitis, but not in severe cases (22).

According to the current study, vitamin D deficiency alone may not trigger atopic dermatitis, but it can worsen the disease. Moreover, although the inverse relationship between serum vitamin D levels and disease severity has been shown in most studies, the effect of vitamin D supplements on patients' recovery has been considered in some studies, for example in the study by, in Mongolia, vitamin D supplementation improved winter-related DA in children (23) and in that by Amestejani et al., vitamin D supplementation improved DA in adults (24). Likewise, Kanda et al. believe that the serum level of the vitamin D is low in AD patients and oral vitamin D supplements help to improve it (25). Accordingly, it seems logical that the serum level of vitamin D in children with

atopic dermatitis should be checked and in case of vitamin D deficiency, a supplement should be prescribed.

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