

Association of the Vitamin - D Level with Atopic Dermatitis - A Retrospective Case Control Study

Taruna Singh¹, Rahul Kumar Sharma^{*2}

Department of Dermatology, Venereology and Leprosy, GMCH Udaipur

Department of dermatology, Geetanjali Medical College, Udaipur, Hiran magri Extn, Udaipur



Abstract:

Vitamin D has an intense immunomodulatory action on the adaptive immune system and innate immune system; hence it has a great role in the pathogenesis and severity of atopic dermatitis. We studied association of the vitamin D level with atopic dermatitis. The retrospective case control study was conducted at a tertiary care hospital. Retrospective screening of records of atopic dermatitis children and normal (age and sex matched) controls was performed to collect their vitamin-D level during the study period (May 2016 to January 2017). Out of seventy cases of atopic dermatitis of age ≤ 16 years, 30 patients were found to be investigated for vitamin-D levels. We collected their vitamin-D levels and compared to the vitamin-D levels of thirty controls who attended outpatient department of pediatrics (without any history of skin or chronic systemic diseases). Vitamin-D level and atopic dermatitis are strongly associated ($p = 0.002$, diagnostic odds ratio- 6.41795% C.I 2.084-19.756, sensitivity 73.33% and specificity 70%).

Keywords: - Atopic dermatitis, Vitamin D level, Childhood eczema, Eczema and Vitamin D.

Introduction

Atopic dermatitis is a common dermatological condition affecting children as well as adults and it is having negative impact on their quality of life. Management is taxing and requires an in-depth knowledge and meticulous evaluation of the complications. The exact pathogenesis of atopic dermatitis is not clear. The immune dysfunction plays a pivotal role in causation of atopic dermatitis. Recently, studies have recognized additional influences of vitamin D on the immunity and atopic dermatitis.^{1,2,3,4} Birth cohort studies have revealed and confirmed that maternal intake of vitamin D from food during pregnancy was negatively related to the risk of allergic respiratory diseases.² It has been shown that infants born to mothers with low vitamin D intake during pregnancy^{3,4} have a higher risk of developing atopic dermatitis (AD). Cross-sectional studies have established a greater risk of AD in infants born in winter compared with those born in summer.⁵ Moreover there is an influencing effect of latitude on the prevalence of AD in children which decides the intensity of sunlight.⁶ A five times increase in the likelihood of AD was found in vitamin D deficiency compared with their vitamin D-replete counterparts.⁷

Sidbury et al⁸ inveterate beneficial effects on AD from oral supplementation with vitamin-D.

Another potential benefit of vitamin D is related to its immunomodulatory action on the adaptive immune system

and innate immune system which has a great impact on the pathogenesis, chronicity, severity and relapses of atopic dermatitis.⁹⁻¹⁴ So vitamin-D levels estimation is essential in patients with atopic dermatitis since it affects the clinical manifestations of atopic dermatitis.

Aim - To study the association of the vitamin D level with atopic dermatitis.

Study period - May 2016 to January 2017

Inclusion criteria for cases -

1. Children with age below or equal to 16 years
2. Who are known cases of atopic dermatitis

Exclusion criteria for cases -

1. Children with other systemic diseases
2. Known case of malnutrition
3. Who had earlier supplementation of vitamin-D
4. Children on phototherapy

Methodology

The retrospective observational case control study was conducted at a tertiary care hospital. Retrospective screening of records of atopic dermatitis children and normal (age and sex matched) controls was performed to collect their vitamin-D level during the study period (May 2016 to January 2017). Out of seventy cases of atopic dermatitis of age ≤ 16 years, 30 patients were found to be investigated for

vitamin-D levels during the study period. We collected their vitamin-D levels and compared to the vitamin-D levels of thirty controls who attended outpatient department of paediatrics (without any history of skin or chronic systemic diseases). The vitamin-D levels <20 ng/mL, 21-29 ng/mL and >30 ng/mL were considered to be vitamin D deficiency, insufficient and normal respectively.

Results

There were thirty cases of atopic dermatitis and thirty normal (age and sex matched) controls without atopic dermatitis in the study. Low vitamin D level was found in twenty two patients of the case group and nine patients of the control group. Out of 60 study subjects (30 cases and 30 controls), 34 (56.6%) were males and 26(43.33%) were females. There was a statistically significant association between vitamin-D level and atopic dermatitis (p = 0.002, diagnostic odds ratio- 6.41795% C.I 2.084-19.756, sensitivity 73.33% and sensitivity 70%).

Table 1: Depicts prevalence of Vitamin-D levels in cases and control.

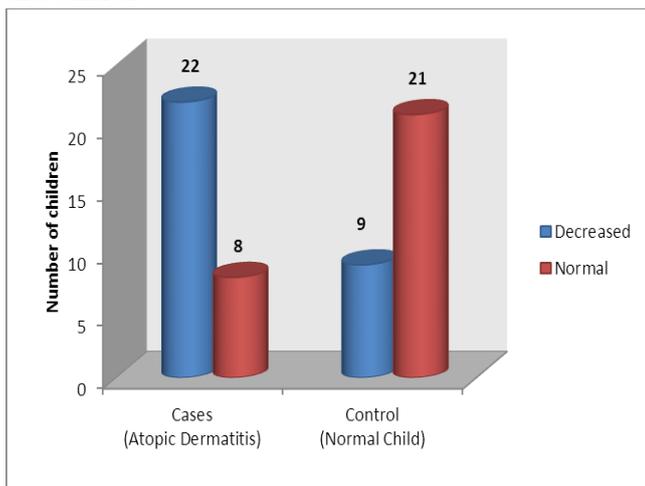


Table 2: Depicts the overall prevalence of low vitamin – D level among different areas.

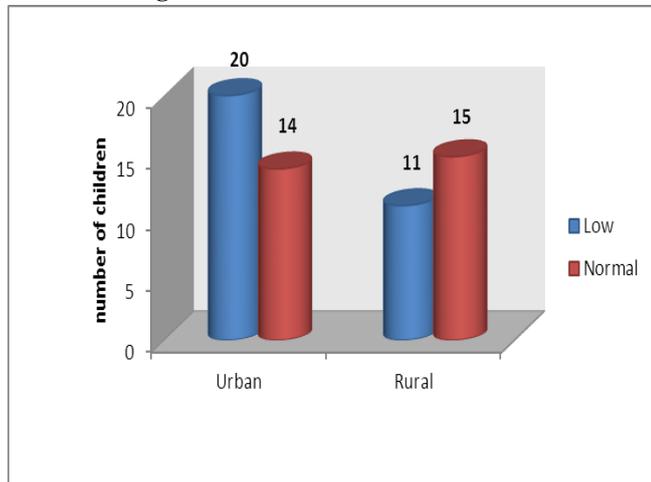


Table 3: Distribution of the study subjects according their location

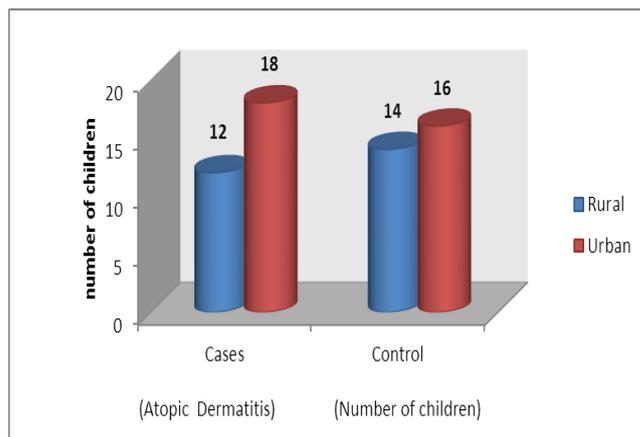
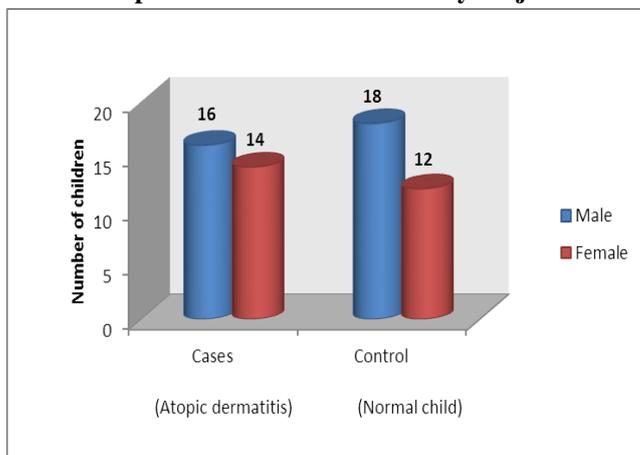


Table 4: Depicts sex distribution of study subjects.



Discussion

Our study revealed high prevalence of low vitamin D level in atopic dermatitis children. Vitamin-D level and atopic dermatitis are strongly associated (p = 0.002, diagnostic odds ratio- 6.41795% C.I 2.084-19.756, sensitivity 73.33% and sensitivity 70%). It is mandatory to do vitamin-D level in every patient with atopic dermatitis. We suggest that a protocol that has all baseline investigations for atopic dermatitis including vitamin-D level can be made. Furthermore all the patients with low vitamin-D should be treated as low vitamin-D is associated severity of atopic dermatitis.

Bibliography-

- [1] Miller J, Gallo RL. Vitamin D and innate immunity. *Dermatol Ther* 2010; 23:13–22.
- [2] Erkkola M, Kaila M, Nwaru BI et al. Maternal vitamin D intake during pregnancy is inversely associated with asthma and allergic rhinitis in 5-year-old children. *Clin Exp Allergy* 2009; 39:875–82.
- [3] Miyake Y, Sasaki S, Tanaka K, Hirota Y. Dairy food, calcium, and vitamin D intake in pregnancy

- and wheeze and eczema in infants. *Eur Respir J* 2010; 35:1228–34.
- [4] Willers SM, Devereux G, Craig LC et al. Maternal food consumption during pregnancy and asthma, respiratory and atopic symptoms in 5-year-old children. *Thorax* 2007; 62:773–9.
- [5] Kuzume K, Kusu M. Before-birth climatologic data may play a role in the development of allergies in infants. *Pediatr Allergy Immunol* 2007; 18:281–7.
- [6] Weiland SK, Hüsing A, Strachan DP et al. Climate and the prevalence of symptoms of asthma, allergic rhinitis, and atopic eczema in children. *Occup Environ Med* 2004; 61:609–15.
- [7] Oren E, Banerji A, Camargo CA Jr. Vitamin D and atopic disorders in an obese population screened for vitamin D deficiency. *J Allergy Clin Immunol* 2008; 121:533–4.
- [8] Sidbury R, Sullivan AF, Thadhani RI, Camargo CA Jr. Randomized controlled trial of vitamin D supplementation for winter-related atopic dermatitis in Boston: a pilot study. *Br J Dermatol* 2008; 159:245–7.
- [9] Yamanaka K, Dimitroff CJ, Fuhlbrigge RC et al. Vitamins A and D are potent inhibitors of cutaneous lymphocyte-associated antigen expression. *J Allergy Clin Immunol* 2008; 121:148–57.
- [10] Yamanaka KI, Kakeda M, Kitagawa H et al. 1,24-Dihydroxyvitamin D₃ (tacalcitol) prevents skin T-cell infiltration. *Br J Dermatol* 2010; 162:1206–15.
- [11] Hata TR, Kotol P, Jackson M et al. Administration of oral vitamin D induces cathelicidin production in atopic individuals. *J Allergy Clin Immunol* 2008; 122:829–31.
- [12] Brehm JM, Celedón JC, Soto-Quiros ME et al. Serum vitamin D levels and markers of severity of childhood asthma in Costa Rica. *Am J Respir Crit Care Med* 2009; 179:765–71.
- [13] Chiu YE, Havens PL, Siegel DH, Ali O, Wang T, Holland KE, et al. Serum 25-hydroxyvitamin D concentration does not correlate with atopic dermatitis severity. *J Am Acad Dermatol*. 2013 Jul; 69(1):40–6.
- [14] Bäck O, Blomquist HK, Hernell O, Stenberg B. Does vitamin D intake during infancy promote the development of atopic allergy? *Acta Derm Venereol* 2009; 89:28–32.