

## ORIGINAL RESEARCH

### Evaluation of Vitamin D levels in Children with Allergic Rhinitis

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#### ABSTRACT

**Background:** Allergic Rhinitis is a common and major chronic respiratory disease due to its prevalence, impact on the quality of life, impact on school performance and productivity, economic burden and its strong link with the Asthma. In recent years the increase in prevalence of Allergic diseases has been found to be associated with low serum vitamin D levels. A relationship has been seen between vitamin D deficiency and Allergic Rhinitis and Asthma.

**Aim and objective:** This study aims to evaluate vitamin D levels in Allergic Rhinitis cases and controls.

**Materials and Methods:** The study was carried out in the Department of Physiology at Index Medical College, Indore, Madhya Pradesh. The study was done on 80 males and female subjects of the age group 6 to 18 years. Forty males and females suffering from Allergic Rhinitis attending Ear, Nose and Throat out-patient department of the Index medical college hospital and research Centre Indore, were taken as cases. Forty healthy males and females was taken as controls after careful selection as per inclusion and exclusion criteria, "Vitamin D" estimation was done by ECLIA method (Electrochemi-Luminescence Immunoassay using Beckmen's commercial kit).

**Results:** The Vitamin D levels were significantly lower in Allergic Rhinitis cases ( $P < 0.001$ ) as compared controls ( $P < 0.000$ )

**Conclusion:** The results of the present study indicate that vitamin D levels are decreased in Allergic Rhinitis cases as compared to the controls. Vitamin D deficiency increases the risk of Allergic Rhinitis.

**Key words:** Allergic Rhinitis (A.R.), Vitamin D deficiency.

#### INTRODUCTION

Allergic Rhinitis is a symptomatic disorder of the nose resulting from IgE mediated immunological reactions following exposure to an allergen. It is the inflammation of nasal airways due to irritation of mucosa by allergens such as pollen, dust and mites. (1)

Globally it is one of the most common chronic diseases and it extracts a heavy price both in terms of medical costs and quality of life. (1). It is a major chronic respiratory disease due to its prevalence, impacts on quality of life, impact on work/school performance and productivity, economic burden and link with Asthma. (1)

Allergic Rhinitis affects the sufferer's quality of life, ability of learning and taking decisions. In school going children it is related to low energy levels, poor memory and performance in the school etc. (1)

The comorbidities of A.R. are Sinusitis and conjunctivitis, and it has a very strong link with Asthma. Rhinorrhea (discharge of the nasal mucus) nasal obstruction, nasal itching, sneezing, headache are few symptoms of allergic rhinitis. (2).

Near about 40% of the patients with Allergic Rhinitis have Asthma and 80% of the asthmatic patients suffer from allergic rhinitis (3). Vitamin D deficiency has been noticed as a cause of the increased percentage of allergic rhinitis. Many studies have shown that there is a widespread prevalence of vitamin D deficiency (4). Main source of vitamin D is Sunlight. It is suggested that global rise (3) in allergic diseases like allergic rhinitis and Asthma may be linked with vitamin D deficiency (5).

Some previous studies have shown that vitamin D deficiency is an important contributing factor for many diseases like Diabetes, Asthma, allergic rhinitis and allergic diseases (6, 7)

The data suggests that vitamin D plays a major role in protection and prevention against allergic rhinitis and allergic diseases. Allergic diseases and asthma are greatest burden during childhood. In the present study we have tried to find out the relationship between vitamin D levels and allergic rhinitis.

Vitamin D deficiency is very common in the general population. In the same way the prevalence of allergic rhinitis, is also common. It confirms that vitamin D levels may affect the risk for the development of Allergic Rhinitis. (8). In India vitamin D deficiency is emerging as major non – infectious epidemic. Vitamin D is an immune modulator (9). It helps in fetal lung maturation and it regulates airway smooth muscle cell proliferation and its differentiation (9).

Allergic Rhinitis and Asthma are a cause for public health concern worldwide (10). Vitamin D plays an important role in innate and adaptive immunity responses (11). So in the present study we have done evaluation of vitamin D levels in children with Allergic Rhinitis and healthy controls.

## **MATERIALS AND METHODS**

This study was carried out in the department of Physiology, Index Medical College, Hospital and Research center Indore, Madhya Pradesh. The study was done on eighty males and females children of the age group 6 to 18 years. Forty males and females suffering from allergic rhinitis attending Ear, Nose and Throat department of Index Medical college, Hospital and Research center Indore, Madhya Pradesh were taken as cases and 40 healthy males and female children were taken as control after careful selection as per inclusion and exclusion criteria.

## **INCLUSION AND EXCLUSION CRITERIA OF PARTICIPANTS**

### **A. INCLUSION CRITERIA**

1. Age – 6 to 18 years
2. Patients diagnosed with Allergic Rhinitis.
3. Young healthy male and female children as a control.
4. Physically and mentally fit.
5. Cooperative and capable of understanding the procedure.
6. Subjects consenting for the study.

### **EXCLUSION CRITERIA**

1. Patients with diagnosis of any other disease like Coronary artery disease, Diabetes Mellitus, Liver disease, Tuberculosis, Carcinoma, renal disease etc.

The study was approved by review and Ethical committee before starting the study work, A written consent was taken from the patients willing to participate in the study. No invasive procedure was carried-out.

### GROUPING OF THE SUBJECTS

**Group 1A:** 6 to 18 years children with Allergic Rhinitis (cases 40 nos.)

**Group 1B:** 6 to 18 years children without Allergic Rhinitis as control (controls 40 nos.)

### SAMPLE COLLECTION OF BLOOD FOR VITAMIN D

Approximately 2 ml of blood sample was collected in plain vial for Vitamin D samples were centrifuged at 3000 rpm for 10 minutes; serum was separated and immediately stored in a freeze at 0° C until further analysis.

The most accurate way to measure the vitamin D in our body is to measure the 25-hydroxyl vitamin D. The 25-hydroxyl vitamin D is the major form found in the blood, and is the inactive precursor to the active form of vitamin D (1, 25-Dihydroxy vitamin D).

As 25-hydroxyl vitamin D has long half-life and higher concentration, it is commonly measured to assess vitamin D concentration in individuals. Vitamin D was estimated by **ECLIA** method using Beckman's commercial kit. Full form of **ECLIA**: - ElectrochemiLuminescence Immunoassay.

### INTERPRETATION OF THE RESULTS

Test results of the patients were determined automatically by the system software. The amount of analytic in the sample was determined from the measured light production by means of stored calibration data. The results were viewed on the screen.

Normal range of vitamin D → 20 - 40 ng/ml

Deficiency of vitamin D < 20 ng/ml

### STATISTICAL ANALYSIS

Statistical analysis; **SPSS** software version 2.0 has been used.

### RESULTS

The mean vitamin D in group 1A has 14.5±1.4 and in group 1B was 29.2±4.7. The vitamin D levels were significantly low in allergic rhinitis cases as compared to the controls. As evaluated by "Z" test, the difference between these two groups was statistically significant. Z=18.78 and P=0.000.

**Table 1: Group 1 A and Group 1 B (6 to 18 years)**

Traits	Cases Group 1 A	Control Group1 B	"Z" value	"P" value	Sig/N.S.
Mean vitamin D ng/ml	14.5±1.4	29.2±4.7	18.78	0.000	H.S.

P<0.05 or P=0.05 Significant, P<0.001 or P=0.000, highly significant.

The vitamin D levels significantly lower in children with allergic Rhinitis. The prevalence of severe vitamin D deficiency was significantly higher in patients with Allergic Rhinitis as compared to normal controls.

### DISCUSSION

Allergic Rhinitis is wide sprayed health problem. It is not a life threatening problem. It affects the personal life of a patient, his/her ability to work, performance, etc. It causes substantial burden on public health in economic terms.

Recently the increase in Allergic Rhinitis has been found to be associated with low vitamin D level (12), In the present study we found vitamin D deficiency in patients with Allergic Rhinitis.

Allergic Rhinitis, Asthma and other allergic disease form important public health problem worldwide (13). Vitamin D deficiency has become a global problem and it has become a major contributing factor for many disease-like complications in maternity, Diabetes, Asthma, Allergic Rhinitis etc. Vitamin D may protect children from viral infections and severity of Allergic diseases (7).

Several studies have documented that deficiency of vitamin D is associated with an increased risk of allergic rhinitis symptoms and Asthma (14). Our results correlate with those studies.

Vitamin D has attracted the attention recently due to various reports of its association with many diseases, from cancer to fertility to longevity (15). There is easy solution to overcome these risk factors, by increasing Sun exposure and diet supplementation. Many reviews have been documented on protective role of vitamin D in allergic rhinitis, Asthma and co related morbidities. (14)

Allergic Rhinitis is a global health problem. It causes major illness and disability worldwide, affecting patient's social life, sleep and their school and work performance, (16).

Recently many studies have reported that vitamin D is associated with the development of allergic rhinitis. Vitamin D has important role in the immune system.

Recent studies indicate that the Th17 and T reg cells are important in the disease course of Allergic Rhinitis (17). Vitamin D prevents proliferation of T reg cells, induces a switch problem from Th1 to Th2 by enhancing the development of Th2 cells, and facilitates the induction of T reg cells. Such data proves the relationship between vitamin D and morbidity of Allergic Rhinitis (17).

Therefore estimation of vitamin D will help in assessing severity of Allergic Rhinitis. Supplementation of vitamin D as a therapy may help in control of allergic diseases.

## CONCLUSION

The results of the present study indicate that vitamin D levels are decreased in allergic rhinitis as compared to controls. Deficiency of vitamin D increases the risk of allergic diseases.

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