

Assessment of Association of Asthma and Vitamin D

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Abstract

Background: The aim is to assess association of asthma and vitamin D. **Subjects and Methods:** Seventy- two patients in age ranged 1- 18 years of either gender with asthma were taken in this study. They were classified into 2 groups. Group I patients were treated with budesonide therapy and group II patients were treated with atomization inhalation of budesonide combined with salbutamol and Vit D supplementation. Healthy subjects were also enrolled. The levels of serum Vit D were determined by ELISA. **Results:** There were 20 males and 16 females in group I and 21 males and 15 females in group II. The mean weight was 17.4 kg in group I and 18.5 kg in group II, history of allergies was seen in 21 in group I and 24 in group II, eosinophil count in peripheral blood was 0.48 in group I and 0.44 in group II and childhood asthma control test score (C-ACT) was 16.7 in group I and 16.5 in group II. The mean vitamin D level in children with asthma was 17.5 ng/ml and in normal children was 32.6. The mean IgE level in children with asthma was 386.2 IU/ml and in normal children was 284.2 IU/ml. It was observed that Vit D levels were positively correlated with MEF25 and MEF50 not significantly correlated with FEV1, FVC, FEV1/FVC. Vit D levels were negatively correlated with IgE and were statistically significant at $P < 0.05$. **Conclusion:** The serum Vit D levels of children with asthma were closely related to the acute asthmatic attacks.

Keywords: Asthma, Allergy, ELISA, Vitamin D.

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Introduction

Asthma is one of the most common chronic diseases and its prevalence has increased worldwide in the last few decades affecting approximately 300 million people. This poses an immense burden on healthcare resources.^[1] Asthma is a prolonged inflammatory disorder which is related with hyper responsiveness of the airways and leads to symptoms such as wheezing, dyspnea, chest tightness, and cough mainly at night or early in the morning.^[2] The factors particularly responsible for asthma are not very clear because of its different presentation in both adults and children. Interleukins (IL)-4, IL-5, and IL-13 (T-helper cell type-2 cytokines) are regulated in the asthmatic airway and are related with increased eosinophilia, mast cell degranulation and increased levels of immunoglobulin E.^[3]

It has been suggested that modernization and westernization have led to vitamin D deficiency among world population. Since, the majority of the population spends time indoors away from sun exposure, leading to vitamin D deficiency. The role of vitamin D in asthma is not yet clear. Few cross-sectional surveys had suggested a probable link between asthma and vitamin D.^[4] Studies have concluded that decreased level of serum 25(OH)D is correlated with an increased prevalence, hospitalization, and increased emergency visits along with declined lung function and

increased airway hyperresponsiveness in asthmatic children.^[5] Considering this, we selected present study to assess association of asthma and vitamin D.

Subjects and Methods

A sum total of seventy- two patients in age ranged 1- 18 years of either gender with asthma were taken in this study. Parental consent was obtained before enrolling their wards in the study and ethical clearance was obtained before starting the study from institutional review committee. A thorough general physical and general examination was carried. Clinical features such as cough, chest tightness, lung wheezing, night and/or early morning onset or exacerbate wer recorded. They were classified into 2 groups. Group I patients were treated with budesonide therapy and group II patients were treated with atomization inhalation of budesonide combined with salbutamol and Vit D supplementation. Healthy subjects were also enrolled. 5 ml of venous blood was taken in a test tube. After the centrifugation at the rate of 3000 r/min for 20 min, the separated serum was placed in an EP tube and stored at - 80°C. The levels of serum Vit D were determined by ELISA. The serum Vit D levels were determined according to the instructions of 25(OH)D3 kit. The results of present study was compiled and entered in MS excel sheet for correct

inference using SPSS version 21.0. Mann Whitney U test was used for the analysis where value of p less than 0.05 was considered significant.

Results

Table 1: Distribution of subjects

Groups	Group I	Group II
Drug	Budesonide therapy	Budesonide, salbutamol and Vit D supplementation
M:F	20:16	21:15

Table 2: Assessment of baseline parameters

Parameters	Group I	Group II	P value
Weight (kg)	17.4	18.5	>0.05
History of allergies	21	24	>0.05
Eosinophil count in peripheral blood	0.48	0.44	>0.05
Childhood Asthma Control Test Score (C-ACT)	16.7	16.5	>0.05

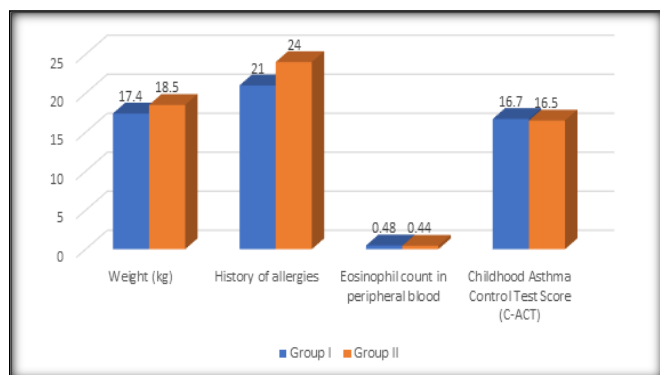


Figure 1: Assessment of baseline parameters

Table 3: Comparison of Vit D and Ig E levels

Parameters	Children with asthma	Normal children	P value
Vit D (ng/ml)	17.5	32.6	<0.05
Ig E (IU/ml)	386.2	284.2	<0.05

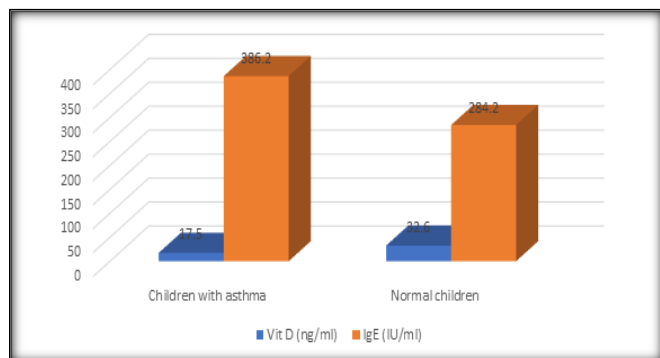


Figure 2: Comparison of Vit D and IgE levels

There were 20 males and 16 females in group I and 21 males and 15 females in group II [Table 1].

The mean weight was 17.4 kg in group I and 18.5 kg in group II, history of allergies was seen in 21 in group I and 24 in group II, eosinophil count in peripheral blood was 0.48 in

group I and 0.44 in group II and childhood asthma control test score (C-ACT) was 16.7 in group I and 16.5 in group II. The difference was non-significant ($P > 0.05$) [Table 2, Figure 1].

Table 4: Correlation between Vit D levels, Ig E and pulmonary function

Items	Correlation coefficient	P value
FEV1	-0.52	>0.05
FVC	0.61	>0.05
FEV1/ FVC	0.35	>0.05
MEF25	0.68	<0.05
MEF50	0.47	<0.05
IgE	-0.51	<0.05

The mean vitamin D level in children with asthma was 17.5 ng/ml and in normal children was 32.6. The mean Ig E level in children with asthma was 386.2 IU/ml and in normal children was 284.2 IU/ml. The difference was significant ($P < 0.05$) [Table 3, Figure 2].

It was observed that Vit D levels were positively correlated with MEF25 and MEF50 not significantly correlated with FEV1, FVC, FEV1/FVC. Vit D levels were negatively correlated with Ig E and were statistically significant at $P < 0.05$.

Discussion

Asthma is one of the most common diseases affecting millions of populations globally. It is a major public health issue. It is a chronic respiratory disease characterized by increased airway inflammation and hyper-responsiveness. Vitamin D is of particular interest in asthma due to its immunomodulatory effects.^[6] Serum 25-hydroxyvitamin D is found to be associated with a wide range of pulmonary diseases, including viral and bacterial respiratory infections, asthma, and cancer. Several researches have reported positive associations between vitamin D and asthma.^[7,8] We selected present study to assess association of asthma and vitamin D.

Our results showed that there were 20 males and 16 females in group I and 21 males and 15 females in group II. Kang et al⁹ evaluated the correlation between the vitamin D levels and asthma attack in children, and to evaluate the effects of combination therapy of atomization inhalation of budesonide, albuterol and Vit D supplementation on asthmatic children. The levels of serum Vit D in the children with asthma were significantly lower than those in the normal children. The serum Ig E level in children with asthma was significantly higher than that in the normal children ($P < 0.05$), but was positively correlated with MEF25 and MEF50 ($P < 0.05$).

Our results showed that the mean weight was 17.4 kg in group I and 18.5 kg in group II, history of allergies was seen in 21 in group I and 24 in group II, eosinophil count in peripheral blood was 0.48 in group I and 0.44 in group II and childhood asthma control test score (C-ACT) was 16.7 in group I and 16.5 in group II.^[9] A study conducted by Gale et al,^[10] shared that child whose mothers had serum 25(OH)D concentrations above 75 nmol/L had five times more risk of

developing asthma at 9 years. Thuesen et al,^[11] in their study on 4,999 Danish adults reported contrasting results and concluded that 25(OH)D levels do not have any effect on the development of asthma and allergic symptoms.

It was found that the mean vitamin D level in children with asthma was 17.5 ng/ml and in normal children was 32.6. The mean Ig E level in children with asthma was 386.2 IU/ml and in normal children was 284.2 IU/ml. Brehm et al,^[12] in their study on 616 asthmatic children in between the ages of 6 and 14 years, reported that vitamin D deficiency/insufficiency was prevalent in 28% of the children and increased levels of vitamin D were related with reduction in asthma exacerbations and reduced visits to emergency department.

It was observed that Vit D levels were positively correlated with MEF25 and MEF50 not significantly correlated with FEV1, FVC, FEV1/FVC. Vit D levels were negatively correlated with Ig E and were statistically significant at P<0.05. Denlinger et al,^[13] conducted a study to determine whether vitamin D supplementation reduces cold symptom occurrence and severity among asthmatics found that despite achieving 25(OH)D levels of 41.9 ng/ml, vitamin D supplementation had no effect on the rate of colds between groups. A study conducted by Martineau et al,^[14] found that intermittent bolus dose of vitamin D3 to a daily low dose regimen was associated with increased risk and duration of upper respiratory infections.

Conclusion

The serum Vit D levels of children with asthma were closely related to the acute asthmatic attacks.

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