VITAMIN D DEFICIENCY AND ITS EFFECT ON SEVERITY OF ASTHMA IN ADULT PATIENTS

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ABSTRACT:

AIM: This study is aimed to assess vitamin D status in asthmatic patients and to assess the relationship between vitamin D level and asthma severity**.**

INTRODUCTION:

Asthma is heterogeneous disease, usually characterized by variable airflow obstruction and bronchial hyper-responsiveness. The world health organization stated that approximately 300 million people have asthma. Recently the effects of vitamin D appear to have regulatory effect on every part of immune system, vitamin D deficiency being linked to an array of immunologically based disease focusing on asthma.

METHOD:

The present study included 50 patients diagnosed as bronchial asthma. The asthmatic patient group was divided into group A, asthma in between attack and group B, exacerbated asthma, that was again divided in subgroup (I), (II), and (III) mild , moderate and severe exacerbated asthma according to symptoms and FEV1. Serum 25 hydroxy vitamin D_3 level in all groups was measured by radio immunoassay method and compared between these groups.

RESULT:

This study shows statistically significant correlation between vitamin D level and severity of asthma. The mean levels of serum 25 hydroxy vitamin D_3 in asthmatic patients are: Group A- 28.24 ± 1.35 ng/ml, mild persistent- 22.6 ± 11.5 ng/ml, moderate persistent - 18.33 ± 1.31 ng/ml, and severe persistent - 10.45 ± 1.84 ng/ml. P value is <0.01, which is highly significant.

CONCLUSION:

Lower level of vitamin D is associated with higher severity of asthma.

INTRODUCTION:

Asthma is heterogeneous disease, usually characterized variable airflow obstruction, chronic airway inflammation and bronchial hyper-responsiveness [1]. Until recently bronchospasm was considered cardinal feature of asthma but now in addition to bronchospasm, airway inflammation is recognized as an essential component of the disease.

Asthma prevalence is rising in both the developed and developing world with >3 million people affected worldwide[2,3].

Vitamin D is fat soluble nutrient and a secosteroid hormone produced endogenously in the skin from sun exposure or obtained from foods that naturally contain vitamin D including cod liver oil. Vitamin D deficiency is diagnosed by the concentration of blood S.25 (OH) D3 (vitamin D) level, the primary circulatory form of vitamin D and then 1, 25(OH) D3. Low serum level of vitamin D has been linked to increased risk of asthma exacerbation in children and adults.

Vitamin D deficiency may predispose to allergic phenotype of asthma and epidemiological evidence suggests that lack of vitamin D is linked to increased incidence of asthma in adults.

Vitamin D deficiency is also associated with increased risk of cardiovascular disease, allergic disorder, autoimmune disease and cancer[4].

Vitamin D deficiency has been implicated in several allergic disorders and immune system dysfunction[5]. Vitamin D has been shown to have role in both innate and adaptive immunity by promoting phagocytosis and modulating the effect of Th1, Th2 and regulatory T cells[6,7].

This study is done to assess the relationship between the severity of asthma and severity of vitamin D deficiency.

MATERIAL AND METHOD:

This is an observational study conducted at SMT. SCL Hospital on the 50 indoor patients of asthma between July 2015 to June 2016.

INCLUSION CRITERIA:

Age > 18 years, diagnosed with asthma according to GINA guideline with written consent.

The study group was divided as:

Group A: Asthma in between attack (intermittent attack) and

Group B: exacerbated asthma group, that was further divided into subgroup mild (I), moderate (II), and severe (III) exacerbated asthma according to severity of symptoms and FEV_1 (GINA criteria).

All patients were admitted and detailed history and assessment was done. All necessary investigations were done in form of complete blood count, plain chest x-ray, pulmonary

function test was done by using spirometer. It included FVC % of predicted, FEV_1 % of predicted and FEV_1/FVC.

In all subjects S.25 (OH) D3 (vitamin D) was measured using enzyme immunoassay (EIA) method[8]. In this study vitamin D level was categorized as insufficient (<30 ng/ml) or sufficient (>30 ng/ml).

Data collected were tabulated and analyzed by SPSS (statistical package from the social science software).

A chi square test was performed to determine correlation between categorical variable. P value < 0.5 is considered significant and <0.01 is considered highly significant.

OBSERVATION & RESULT:

1. **Comparison between demographic data (age, sex, smoking status) among Study Group.**

		StudyGroup (%)
Age	Mean± SD	41.22 ± 9.6
Sex	male	28(56%)
	female	22(44%)
Smoking	Smoker	23(46%)
	Non-Smoker	27(54%)

A total of 50 patients (28 males, 22 females) were enrolled in this study, whose age ranged from 23 to 58 years with a mean age of 41.2 ±9.6 years. Active smoking was found in 23 cases (46%).

20 patients were from Group A with mean age 40.75 ± 10.7 years and 30 patients were from Group B with mean age of 41.65 ± 8.3 years.

2. **Comparison of serum Vitamin D levels between Asthma in between attack Group (A) and Exacerbated Asthma Group (B).**

	Asthma in between attack Group (A)	Exacerbated Asthma Group (B)	p value
Serum Vitamin D	28.24 ± 1.35	16.05 ± 5.47	<0.01

Level			

This table shows that, serum vitamin D is significantly lower in the exacerbated asthma group (B) as compared to Asthma in between attack group (A) (P value < 0.01).

3. **Comparison of Serum Vitamin D levels between Asthma in between attack Group (A) and Severe Exacerbated Asthma Subgroup (III).**

	Asthma in between attack Group (A)	Severe Exacerbated Asthma Subgroup (III)	p value
Serum Vitamin D Level	28.24 ± 1.35	10.45 ± 1.84	<0.01

This table shows that serum vitamin D is significantly lower in the Severe Exacerbated Asthma Subgroup (III) compared to Asthma in between attack group (A) (P value < 0.01).

4. **Comparison of Serum Vitamin D levels between Mild (I), Moderate (II) and Severe (III) Exacerbated Asthma Subgroups.**

	Mild (I) Exacerbated Asthma subgroup	Moderate (II) Exacerbated Asthma subgroup	Severe (III) Exacerbated Asthma subgroup	P value
Serum Vitamin D Level	22.6 ± 11.5	18.33 ± 1.31	10.45 ± 1.84	<0.01

This table shows that serum vitamin D is significantly lower in moderate exacerbated asthma subgroup B compared to mild and severe compared to mild and moderate. (P value < 0.01).

There is statistically significant negative correlation between vitamin D level and severity of asthma. The mean levels of serum 25(OH)D_3 (vitamin D) in asthmatic patients are: Group A- 28.24 ±1.35 ng/ml, Mild persistent- 22.6± 11.5 ng/ml,Moderate persistent -18.33 ± 1.31 ng/ml,Severe persistent -10.45 ± 1.84 ng/ml.P value is <0.01 which is highly significant.

DISCUSSION :

Bronchial asthma is a major health problem. It has dramatically increased worldwide over last few decades, in both developed and developing countries. Result of our study shows that serum vitamin D level is significantly lower in asthmatic patients and lowest value was observed in severe exacerbated group B (group B III).

Shaaban and Hashem[9] investigated serum vitamin D levels in 75 adults with asthma and 75 adult healthy controls and demonstrated that, Vitamin D deficiency was observed in 78.66% asthmatic patients whereas 85% of healthy control subjects expressed sufficient levels thus results correlating with this study.

This study is also in agreement with that of EmanShebl et al[10]., who Conducted a study on 66 non-smoking adult asthmatic patients and 30 healthy adult volunteers and found that 40% asthmatic patients suffered from vitamin D insufficiency, while in the control group vitamin D insufficiency was present in 20%, with a significant increase in the number of severe asthmatic patients with vitamin D insufficiency compared with those with sufficient vitamin D.

Also Stephanie Korn et al[11]. studied serum vitamin D levels in 280 adults with asthma and found that, vitamin D levels in adult asthmatics were low and vitamin D insufficiency or deficiency was significantly related to asthma severity.

Similarly Montero Arias et al[12]. demonstrated that, serum vitamin D levels were examined in 121 adults with asthma and noted that, in asthmatic patients with low vitamin D levels, there was significant association between vitamin D levels and the risk of severe asthma, the risk of hospitalization or visit to the emergency department due to asthma.

Shaaban and Hashem demonstrated that, there was a significant association between higher serum vitamin D concentration and better Lung function.

CONCLUSION:

Vitamin D deficiency is highly prevalent in asthmatic patients. There is correlation between asthma severity and vitamin D level, lower levels being associated with higher severity of asthma.

Further studies are needed to determine the role of vitamin D in treatment of bronchial asthma in terms of improvement in pulmonary function test and severity of asthma. S.25 hydroxy vitamin D should be considered as a routine assessment of patients with bronchial asthma.

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