

## To See the Levels of Vitamin D in Patients of Asthma

FARAH NAWAZ, RAB NAWAZ RAJA

### ABSTRACT

**Background:** Asthma is a condition, which is increasing worldwide, since 1960. There are several known aggravating factors for asthma like environmental pollution, childhood allergies etc. But some contributing factors are still in grey zone, like vitamin D in these patients. Vitamin D plays an important role in immunomodulation and in inhibition of release of immunoglobulins and interleukins by B cells and T cells respectively. So its deficiency may contribute to severe asthma. To see the association between vitamin D and severity of asthma we conducted a cross sectional observational study at LGH.

**Study design:** It was a cross sectional observational study.

**Method:** 50 patients of chronic stable asthma and 50 controls were taken. Their history was taken and systemic examination was done and level of 1,25 dihydroxycholecalciferol was done.

**Result:** A significant correlation was found between low levels of vitamin D and control of asthma.

**Conclusion:** Vitamin D deficiency may be associated with poor control of asthma, which warrants further studies to be done in asthmatic patients by supplementing them with vitamin D and then seeing the results.

**Keywords:** Asthma, vit. D, pollution, allergy

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### INTRODUCTION

Asthma is a very common disease worldwide, effecting almost 334 million people<sup>1</sup>. Since 1960 asthma patients are continuously increasing everywhere<sup>2</sup>. Asthma is a chronic condition, in which there is reversible and repeated bronchospasm because of many triggers, which do not affect normal individuals<sup>3</sup>. There can be several contributing factors of asthma, like, ethnicity<sup>4</sup>, obesity<sup>5</sup> and environmental pollution.

It has also been observed in some studies that frequency of asthma was more in individuals living in inner city and involved more in household activities<sup>6</sup>. This observation forced some researchers to think that perhaps decreased sunlight and hence decreased vitamin D levels are associated with severity of asthma.

Vitamin D plays an important role in homeostasis of calcium and phosphate. Calcitriol is activated form of vitamin D. It decreases levels of some of interleukins, produced by T cells. It is also seen that vitamin D decreases production of immunoglobulins by B cells. B cells, T cells and dendritic cells express receptors for vitamin D.<sup>(7)</sup> It also participates in innate immune response against various microbial agents<sup>8</sup>. So deficiency of vitamin D may be linked to severe asthma and exacerbation of other infective diseases<sup>9</sup>.

Therefore, to see the association of vitamin D levels and control of asthma in Pakistani population,

we conducted a cross sectional observational study at Lahore General Hospital.

### MATERIAL AND METHODS

It was a cross sectional observational study conducted at Lahore General Hospital from January 2017 to June 2017. A written consent was taken from all participants. 50 patients of chronic stable asthma were selected from out patient department and were matched to healthy controls of same age group and gender. Those having some other chronic or debilitating disease were excluded from study. 50 asthmatic, including 33 males (66%) and 17 females (34%) were enrolled in the study. Their mean age group was between 42±10 years. While amongst controls, 38 males (76%) and 12 females (24%) were taken, with mean age group of 40±13 years. Their history was taken and systemic examination was done and they were put in to different categories according to GINA guidelines<sup>10</sup>. Furthermore, the severity of symptoms was also assessed by performing pulmonary function tests, that include FEV<sub>1</sub>, FVC and PEF. Their vitamin D level was also done from laboratory. The reference range of normal vitamin D is 30 to 60 ng/ml. Vitamin D deficiency is defined as level less than 20 ng/ml, while vitamin D insufficiency is defined as, when levels are between 30 ng/ml<sup>10</sup>. Results were tabulated in MS excel sheet and descriptive statistics like mean, range and percentages were calculated. For comparison of 2 groups student T test was applied.

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Correspondence to Dr Farah Nawaz Assistant Professor Medicine  
Lahore General Hospital Lahore. E mail:  
doctorfarahsadiq@gmail.com

## RESULTS

Out of 33 males (66%), we categorized them in 3 groups according to GINA guidelines. 5(15%) were having mild asthma. While 12(36%) were having moderate disease and 16(48%) out of 33 males were having severe asthma. Whereas among 17(34%) females, 2(12%) were in mild category, and 5(29%) were having moderate disease, and 10(59%) were having severe asthma. In all these patients, it was observed that vit D deficiency (<20ng/ml) was in 65% of patients p value <0.001. While 80% had vitamin D insufficiency (<30ng/ml) p value <0.001. Amongst patients with vitamin D deficiency, (31%) were males and (34%) were females in vitamin D insufficient group. (22%) were females and (18%) were males. Out of 26 total patients of severe asthma (male+female), 48% were having vitamin D deficiency and 52% were having vitamin D insufficiency. and out of 17 patients of moderate asthma (male+female) 16% were having vitamin D deficiency and 75% were having vitamin D insufficiency and 9% were having normal vitamin D levels. 1% vitamin D insufficiency was found and rest were normal. While out of 50 healthy controls 10(5%) were in vitamin D insufficient group and 1%, 2 controls were vitamin deficient. 38(76%) controls were having normal vitamin D levels. So far it has been observed that low vitamin D levels are associated with severity of asthma, regardless of sex, with only slight increase rate of decreased vitamin D in females, which is perhaps due to decreased sun exposure. Most of patients with severe asthma are in vitamin D insufficient group rather than deficient group.

## DISCUSSION

Our study shows that 65% of patients were vitamin D deficient and 80% were in vitamin D insufficient group in comparison to 5% vitamin D deficient and 1% vitamin D insufficient healthy controls. Most of vitamin D deficiency and insufficiency was seen in severe asthmatic patients i.e., (48% and 52%) respectively. While a fair amount of patients with insufficient vitamin D were also seen in moderate asthma category i.e., (75%) vs only (16%) vitamin D deficient patients. In mild asthmatic patients only, 2 patients with vitamin D insufficiency (1%) were found. So out of low level vitamin D groups, vitamin D insufficient group prevails in mild, moderate and severe asthma than vitamin deficient group, and vitamin D is deficient or insufficient more in severe and moderate asthmatic patients than mild asthmatic patients. Several trials are being done worldwide regarding vitamin D levels in asthmatic patients. Columbo et

al<sup>11</sup> showed that 79% of elderly asthmatics have low vitamin D levels. Ginde et al<sup>12</sup> in another study tell that there is an association between decreased vitamin D levels not only in asthma but some other respiratory diseases too. Brehm et al<sup>13</sup> showed similar results in another study.

Another cross sectional study done in 616 Costarican children<sup>14</sup> showed low vitamin D levels in severely asthmatic children. Similarly A prospective study was done on North American children, showing increased severity aggravation and admission rates in asthmatic patients with low vitamin D levels.

One study shows that if vitamin D levels taken at the age of 6 year is low, such children have more chances of having asthma at the age of 14 years<sup>15</sup>. Sandhu and Casale also show a close association between vitamin D and asthma<sup>16</sup>. It is important to tell that where most of studies are in accordance with our study some trials show inverse relationship between vitamin D levels and severity of asthma<sup>17,18,19</sup>. Few others show no association between vitamin D and asthma<sup>20,21</sup>.

## CONCLUSION

Low vitamin D levels are associated with poorly controlled and severe asthma. It can be regarded as marker of severity of asthma. So its levels should be measured in all asthmatic patients and where ever found low should be corrected by giving vitamin D supplements. This study suggests further studies on asthmatic patients by giving them vitamin D supplements and observing the control of symptoms.

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