



## Vitamin D Deficiency in Asthmatics from an Urban Population in India

Author

**Dr Mohammed Soheb Sadath Ansari**

Associate Professor, Department of Respiratory Medicine, Bhaskar Medical College, Moinabad, Hyderabad, Telangana, India

Email: [mohdsoheb@yahoo.co.in](mailto:mohdsoheb@yahoo.co.in), Cell: 91-9573593652

### Abstract

**Background:** Indian population is deficient in the sunshine vitamin inspite of availability of plenty of sunshine. Vitamin D deficiency is endemic problem in India with a prevalence of 70-100%. On the other hand Asthma is also on rise and in spite of the best available treatment the control of Asthma is poor in our population. Is Vitamin D deficiency which is rampant in our country, one of the factors responsible for this poor control? Dietary habits and indoor life styles may be responsible for the deficiency of Vitamin D. The impact of Vitamin D on Asthma is becoming an important area of research.

**Material and Methods:** A total of 205 Asthma patients were enrolled and their Vit D levels were assessed by CLIA (chemiluminescence Immune assay) and graded as deficient, insufficient and normal. The Asthma patients were under follow up since one year and their level of control was assessed as per GINA guidelines. The percentage of well controlled among the three groups of Vit D levels were recorded.

**Results:** From among a total of 205 Asthma patients 55.12% were deficient in Vit D 20.48% were having insufficient Vit D levels and 24.39% had normal Vit D levels. The distribution of Vit D deficiency among both sexes was almost same. The level of control among the three groups was also same in our study

**Conclusion:** Vit D deficiency is rampant among general population as well as Asthma patients. This was shown in our study also. As Vitamin D has anti infective, anti inflammatory and immune modulatory actions this area becomes important for research as it may have significant impact on Asthma.

**Keywords:** Vitamin D Asthma Deficiency.

### Background

Asthma prevalence in general adult population in India ranges from 2-12% in adults and 3-38% in children.<sup>[1]</sup> Asthma is an inflammatory disorder of lungs with reversible airway obstruction caused by indoor aero allergen. On the other hand Vitamin D has anti inflammatory and anti infective properties. The prevalence of Vitamin D deficiency in Indian population ranges from 70-

100%.<sup>[2]</sup> Vitamin D deficiency is no more endemic to one country but has become a pandemic problem. Vitamin D deficiency among health care professionals was 79%, insufficiency was 15% and only 6% had sufficient Vitamin D levels.<sup>[3]</sup> Vitamin D also known as the sunshine vitamin is a fat soluble vitamin. It is responsible for absorption of minerals like calcium etc from the gut. Vitamin D is absorbed from dietary intakes like fish and

dairy products but this quantity is minimal and the main source of Vitamin D is skin in the presence of UV rays of sunlight. 7 dehydro cholesterol is converted to Vitamin D<sub>3</sub> in the skin. Vitamin D the major portion of which is Vitamin D<sub>3</sub> is inactive and is activated in liver by hydroxylation to form 25 OH D<sub>3</sub> and later this is further hydroxylated in kidney and target tissues to form the active 1,25 OH D<sub>3</sub>.

### **Impact of Vitamin D on immunity and Asthma**

Since decades the role of Vitamin D as an immune protective vitamin is known.

This was the reason that Tuberculosis patients were supplemented with Vitamin D and were exposed to sunlight in the sanatoriums. Recently studies are showing the beneficial role of Vitamin D in childhood infections and Influenza. Vitamin D helps in immune regulation and protection against infections<sup>[4][5]</sup> It has been shown that Vitamin D supplementation helps in prevention of infectious diseases like lower respiratory tract infections as well as non infectious diseases like heart disease, Diabetes Mellitus and cardiovascular disease<sup>[6][7]</sup> Vitamin D also has an important role in innate and acquired immunity in our body.<sup>[8][9]</sup> Low Vitamin D levels in children is responsible for increased airway muscle, low lung function and steroid resistance.<sup>[10]</sup> In study by Brehm JM et al Vitamin D deficiency correlated with severity of Asthma.<sup>[11]</sup> Majak P et al showed in their study that Vitamin D supplementation in children decreased the infection induced exacerbation of Asthma.<sup>[12]</sup> Esfandiar et al showed a strong relationship between Vitamin D deficiency and severity of Asthma.<sup>[13]</sup>

A number of studies have shown that vitamin D has beneficial effects in controlling Asthma. On the other hand Asthma patients with low Vitamin D levels had more number of exacerbations. Studies have shown that both males and females equally had low Vitamin D levels even in India where still majority of females remain indoor.

In spite of best available treatment the control of Asthma in India is very poor and there are

multiple contributing factors to it. Is vitamin D deficiency which is epidemic in India contributing to poor control? Sabah F Iqbal in his study explained the mechanisms by which Vit D can affect Asthma.<sup>[14]</sup> He explained that vit D helps improve immune function, has into inflammatory function, slows cell cycling, reduces remodelling, augments glucocorticoid actions and overcome glucocorticoid resistance.<sup>[14]</sup> Banerjee A et al showed that Vitamin D suppressed steroid resistance gene.<sup>[15]</sup> Presence of Vitamin D resistance gene predisposes to Atopy and Asthma.<sup>[16]</sup> Cathelicidin is a peptide regulated by active form of Vitamin D (1,25 OH D )

This peptide is responsible for the prevention of mucosal infection.<sup>[17]</sup> Asthma is an inflammatory disorder and Vit D modulates the chemokine expression and thus controlling the inflammatory process.<sup>[18]</sup> One study didn't had association between severity of Asthma and Vit D deficiency.<sup>[19]</sup> Vitamin D has shown to increase Treg (regulator cells), decrease Th1 and the impact on Th2 is found to be variable.<sup>[20]</sup>

### **Aims and Objectives**

To study the blood levels of Vitamin D in known cases of Asthma and assess the level of control in the three groups of normal, insufficient and deficient Vitamin D levels in the blood.

### **Material and Methods**

A Total of 205 patients of Asthma were enrolled between 2017 and 2018 at Bhaskar Medical College. The patients were above 10 years and below 60 years of age. Both male and female patients were enrolled. These patients were diagnosed one year back as Asthmatic and were under treatment and follow up. The diagnosis and treatment was done as per GINA guidelines. The height and weight of the patient were recorded and the patient was asked to perform spirometry on a ultrasonic sensor machine. The best of three manoeuvres was accepted. The graphs recorded were acceptable and the difference between FVC of two attempts was less than 150 ml. The

improvement in FEV1 after administration of 200 mcgs of salbutamol through MDI and spacer was recorded. The improvement of 15% in FEV1 was diagnostic of reversible airway disease. The control of Asthma was assessed as the GINA guidelines. The symptoms, need of reliever medication and limitation of activity were recorded and scored. Grading of control was calculated from these scores. The Vitamin D levels were assessed in the venous blood sample by Chemiluminescent Immune Assay method.

The following grading of Vit D levels in the blood was followed. Less than 30 ng/ml was considered insufficient, less than 20 ng/ml as deficient and above 30 ng /ml as normal.

Vit D Levels	
Deficient	< 20 ng/ml
Insufficient	< 30 ng/ml
Normal	> 30 ng/ml

## Results and Discussion

Total 205 Asthma patients		
Vit D Deficient	113 of 205	55.12%
Vit D Insufficient	42 of 205	20.48%
Vit D Normal	50 of 205	24.39%

	Percentage Females	Percentage Males
Vit D Deficient	(58 of 113 ) 51.32%	(55 of 113) 48.67%
Vit D Insufficient	(24 of 42) 57.14%	(18 of 42) 42.85%
Vit D Normal	(26 of 50) 52%	(24 of 50) 48%

% of Well controlled Asthma among the three groups	
Vit D Deficient	9%
Vit D Insufficient	11%
Vit D Normal	10%

From among a total of 205 Asthma patients 55.12% were deficient in Vitamin D

20.48% were having insufficient Vitamin D levels and 24.39% had normal Vitamin D levels. This

finding correlated with study by Ritu G et al who showed that the prevalence of Vitamin D deficiency in indian population to be 70-100%<sup>[2]</sup>. even in health care professionals the Vitamin D deficiency was found by 79%.<sup>[3]</sup> In our study the distribution of Vitamin D deficiency among males and females was almost same. (51.32% vs 48.67%). Although the severity and control of Asthma was strongly linked to Vitamin D deficiency in may studies in our study the percentage of well controlled Asthma were almost same among all three groups. (9% vs 11% vs 10%) This finding was also observed by Devereaux et al in their study.<sup>[19]</sup>

## Conclusion

A high prevalence of Vitamin D deficiency and in sufficiency was observed among Asthmatic patients from an urban area. There was not much of a difference in sex distribution and the level of asthma control in our study.

With high prevalence of poor Asthma control in our country and the known beneficial functions of Vitamin D like Into inflammatory, anti infective and Immuno modulatory actions there is a need to maintain normal Vitamin D levels in Asthma Patients.

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