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Original Research Article

Serum Vitamin D Levels in Chronic Allergic Rhinitis

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ABSTRACT

Aims & Objectives: The present study is performed to assess the relationship between serum vitamin D level and occurrence of allergic rhinitis.
Materials & Methods: The study included 120 patients of chronic allergic rhinitis and 120 normal individuals as control. Serum vitamin D level of all the cases and controls was measured. Mean daily allergic rhinitis symptom score of all the cases was recorded. The results were compared.
Results: Out of 120 cases included in present study out of which 63 (52.5%) were male and 57 (47.5) were female. Age of the patients ranges from 20 to 60 years with the mean age of 36.5 years. Mean serum vitamin D level in allergic rhinitis patients (group A) was 18.79±9.81 ng/ml while in controls (group B), the mean was 36.11±13.22 ng/ml. 53.33% of allergic rhinitis cases were deficient in serum vitamin D level (<20 ng/ml), 34.16% were having insufficient vitamin D level (20-30 ng/ml) and 12.5% were having normal vitamin D level (>30 ng/ml).
Conclusion: The present study suggests a possible correlation between serum vitamin D level and allergic rhinitis. The patients of allergic rhinitis were found deficient in serum vitamin D level. Moreover, the deficiency was found to be more pronounced in the patients of severe allergic rhinitis.

Keywords: allergic rhinitis, Vitamin D, rhinorrhoea, allergen, immunity

INTRODUCTION

Allergic rhinitis is a common problem worldwide, affecting about 10-54% of the world population. [(1)] It is an atopic condition caused by inflammatory reaction after exposure to an allergen and associated with immunoglobulin E (Ig E) mediated immune response to the allergen.

Allergic rhinitis badly affect the quality of life of the patient due to various issues like loss of night sleep, daytime fatigue, decreased cognitive functioning and impaired work performance. [(2)]

The prevalence of allergic rhinitis is increasing in past few decades. This increase in prevalence has been hypothesized as being due to increase in urbanization and lifestyle modification which has led to decreased exposure of children to various environmental allergens resulting in weaker immune system and consequently lead to development of allergy. This hypothesis is well known as 'hygiene hypothesis. [(3)]

Vitamin D plays an important role in calcium homeostasis and proper muscle function. It also plays key roles as a natural immunomodulator. In past few decades many studies have been done to correlate the serum level of vitamin D and development of allergic diseases. Vitamin D has an immunomodulatory effect on allergen-induced inflammatory pathways [(4)] by acting on vitamin D receptors expressed

on immune cells like B cells, T cells, dendritic cells and macrophages. The present study is performed to assess the relationship between serum vitamin D level and occurrence of allergic rhinitis.

MATERIALS AND METHODS

The present study is a prospective study carried out in Department of Otorhinolaryngology, Ananta Institute of Medical sciences, Rajsamand, Rajasthan during the period from February 2017 to February 2019.

120 patients attended otorhinolaryngology outdoor with the symptoms of allergic rhinitis (sneezing, rhinorrhoea, itching in nose, nasal blockage) were included in the study. Complete ENT examination of the patients was carried out.

The study included two groups viz. Group A which included 120 cases of chronic allergic rhinitis and Group B which included 120 normal individuals as controls who had no history of allergic rhinitis or any other disease which can affect serum vitamin D level.

Serum vitamin D level of all the cases and controls was measured. Mean daily allergic rhinitis symptom score (MDARSS) of all the cases was recorded.

Patients who had taken the vitamin D supplement in recent past or those having coexisting disease along with allergic rhinitis which can affect serum vitamin D level were excluded from the study.

Various diseases which can affect serum vitamin D level are osteomalacia, rheumatoid arthritis, thyroid disorders, Crohn's disease, ulcerative colitis, celiac disease, multiple sclerosis, cystic fibrosis, rickets etc.

Serum vitamin D level of allergic rhinitis patients was compared with that of normal individuals (controls).

RESULTS

A total of 120 cases were included in present study out of which 63 (52.5%) were male and 57 (47.5) were female.

Age of the patients ranges from 20 to 60 years with the mean age of 36.5 years.

Mean serum vitamin D level in allergic rhinitis patients (group A) was 18.79±9.81 ng/ml while in controls (group B), the mean was 36.11±13.22 ng/ml. The difference was found to be statistically significant (p value <0.001).

Mean daily allergic rhinitis symptom scores (MDARSS) of the allergic rhinitis group along with serum vitamin D level are depicted in (table.1). 53.33% of patients in group A were deficient in serum vitamin D level (<20 ng/ml), 34.16% were having insufficient vitamin D level (20-30 ng/ml) and 12.5% were having normal vitamin D level (>30 ng/ml).

The severity of allergic rhinitis was found to be inversely proportional to the serum vitamin D level. MDARSS was 14.23±7.1 in the 64 patients of deficient serum vitamin D level, while it was 12.56±6.8 in insufficient serum vitamin D level and was 10.22±6.1 in normal serum vitamin D level.

Table 1. Correlation between serum vitamin D level and allergic rhinitis symptom score

Serum Vitamin D level	Number of patients	Mean daily allergic rhinitis symptom score
< 20 ng/ml (deficient)	64 (53.33%)	14.23±7.1
20-30 ng/ml (Insufficient)	41 (34.16%)	12.56±6.8
>30 ng/ml (Normal)	15 (12.5%)	10.22±6.1
Total	120	-

DISCUSSION

Allergic rhinitis is a common problem worldwide. The burden of allergic rhinitis is very large, constituting about 55% of all types of allergies. [(5)] In India alone, the incidence of allergic rhinitis is reported to be ranged between 20-30% with continuous increasing trend in past few years. [(6)]

Allergic rhinitis is a hypersensitivity disease which is mediated by specific immunoglobulin E (IgE) when exposed to an allergen. IgE is capable to crosslink high and low affinity receptors of effector cells

like mast cells and basophils and starts allergic cascade which results in allergic rhinitis symptoms like sneezing, rhinorrhoea, nasal itching and nasal obstruction. [7,8]

Vitamin D has an important role in calcium homeostasis. It also plays key roles as a natural immunomodulator. In past few decades many studies have been done to establish relationship between serum level of vitamin D and development of allergic diseases. Vitamin D has an immunomodulatory effect on allergen-induced inflammatory pathways [4] by acting on vitamin D receptors (VDR) expressed on immune cells like B cells, T cells, dendritic cells and macrophages. The mechanism which explains the role of vitamin D in rapid and local immune response can be understood by the fact that final activation step for 25 OH-D3 to 1,25 $(OH)_2$-D3 is quickly stimulated in monocytes and epithelial cells. Toll like receptors (TLR-2) and cytokines, such as TGF-b or IFN-g can further trigger the local conversion of stored inactive 25 OH- D3 to the highly active 1,25 $(OH)_2$-D3. This enzymatic activation of vitamin D permits rapid triggering of gene expression and enables it to participate in a relevant way during defense against microbes. [9-11]

In present study the serum vitamin D level was found deficient in patients of chronic allergic rhinitis (18.79±9.81 ng/ml) while in controls (group B), the mean vitamin D level was 36.11±13.22 ng/ml. the results were in favor of similar studies done in the past. [12, 13]

In contrast, a study done by Back O et al [14] suggested that high level of vitamin D is a risk factor for occurrence of allergic disease. They reported that excessive intake of vitamin D during infancy was significantly associated with higher risk of developing allergic rhinitis and other atopic conditions.

In present study, the severity of allergic rhinitis was found to be inversely proportional to the serum vitamin D level. MDARSS was 14.23±7.1 in the 64 patients of deficient serum vitamin D level, while it was 12.56±6.8 in insufficient serum vitamin D level and was 10.22±6.1 in normal serum vitamin D level. The results were similar to another study done by Bhasker Thakkar et al. They also reported that deficiency of serum vitamin d level was more pronounced in the patients having severe allergic rhinitis. More total rhinitis symptom score was related with less vitamin D level. [15]

CONCLUSION

The present study suggests a possible correlation between serum vitamin D level and allergic rhinitis. The patients of allergic rhinitis were found deficient in serum vitamin D level. Moreover, the deficiency was found to be more pronounced in the patients of severe allergic rhinitis. The serum level of vitamin D was found inversely proportional to the mean daily allergic rhinitis score. Many studies have been done in the past to establish the relationship between vitamin D and allergic rhinitis but results were inconclusive or inconsistent in most of the studies. Finally, we suggest the formation of larger series through collection of such studies, which include larger demographic data to confirm our findings. Further research is required on the role of vitamin D therapy in the treatment of allergic rhinitis.

Conflict of Interest:

No conflicts of interest exist for the authors. No relevant financial relationship exists between the authors and products or procedures used in this manuscript.

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