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VITAMIN D SERUM LEVELS AND SERUM TOTAL IMMUNOGLOBULIN E LEVELS IN PATIENTS WITH ALLERGIC RHINITIS

Otolaryngology

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ABSTRACT

BACKGROUND: Allergic rhinitis (AR) is the most common type of chronic rhinitis, evidence suggests that the prevalence of the disorder is increasing. In recent years, the world-wide increase in allergic diseases has been associated with low vitamin D. In the presented study, we evaluate plasma vitamin D and serum total immunoglobulin E (IgE) levels in patients with allergic rhinitis.

METHODS: This is observational case-control study involved 49 patients with allergic rhinitis without any other nasal and systemic diseases, and 44 consecutive, age- and sex-matched healthy subjects. Plasma 25-hydroxyvitamin D and serum total IgE levels of all subjects were quantified with electrochemiluminescence technique. Follow- up done by visits and phone calls. Templates were generated in MS excel sheet and data analysis was done using SPSS software (version 20). Results were compared between the groups.

RESULTS: Plasma vitamin D levels of the subjects with allergic rhinitis (median 8.03 ng/ml, range 3.00-17.97 ng/ml) were significantly lower than the control group (median 10.52 ng/ml, range 3.30-25.92 ng/ml) .Serum total IgE levels of patients with allergic rhinitis (median 48.65 IU/ml, range 1.77-812.00 IU/ml) were significantly higher when compared to the control group (median 32.49 IU/ml, range 0.14-104.60 IU/ml) .

CONCLUSIONS: We found lower plasma vitamin D levels and higher serum total IgE levels in patients with allergic rhinitis.

KEYWORDS

Allergic rhinitis ,Serum IgE level, Serum vitamin D level.

INTRODUCTION

Allergic rhinitis (AR) is the most common type of chronic rhinitis, affecting 10-20% of the population, and evidence suggests that the prevalence of the disorder is increasing. Severe AR has been associated with significant impairments in quality of life, sleep and work performance. There are good treatments available for AR, including antihistamines and topical corticosteroids. Yet, there is a need for new treatment options, particularly aiming at new targets and associated with reduced side effects. The prevalence varies among countries, probably because of geographic and aeroallergen differences. In India, AR is considered to be a trivial disease, despite the fact that symptoms of rhinitis were present in 75% of children and 80% of asthmatic adults.

Allergic rhinitis is a type 1 hypersensitivity reaction mediated by immunoglobulin E (IgE). In recent years, the world-wide increase in allergic diseases has been associated with low vitamin D. Growth in populations has resulted in people spending more times indoors, leading to less sun exposure and less cutaneous vitamin D production. In the presented study, we evaluate plasma vitamin D and serum total immunoglobulin E (IgE) levels in patients with allergic rhinitis.

MATERIALS AND METHODOLOGY

- This is prospective , single centre , observational,case control study comprised 93 subjects (49 patients with AR and 44 control subjects . All patients were recruited in the study in March to July 2017 in dept. of E.N.T & H.N.S, RIMS, Ranchi . Patient was diagnosed clincally using Allergic rhinitis and its impact on Asthma (ARIA) 2008 criteria.
- Vitamin D deficiency is defined as 25(OH) D levels <20 ng/ml, vitamin D insufficiency defined as 25(OH) D levels between 20 and 30 ng/ml . Patients with serum vitamin D levels >30 ng/ml were considered as normal.
- Serum IgE level < 150 IU/ml considered as normal.
- Exclusive criteria concerned patients who had co morbid disease in addition to allergic rhinitis that could affect vitamin D serum levels Such diseases included rheumatoid arthritis, cystic fibrosis, multiple sclerosis, ulcerative colitis, Crohn's disease, celiac disease , rickets, osteomalacia, sarcoidosis and thyroid dysfunctions
- Individuals who had received medications including corticosteroids, barbiturates, bisphosphonates, sulfasalazine, omega3and vitamin D components such as calcium-D were excluded.

RESULTS

- Forty-nine patients with allergic rhinitis (19 men and 30 women) and 44 control subjects (16men and 28women)were enrolled in our study. The mean ages of patients with allergic rhinitis and control subjects were 25.73 ± 8.79 years (range 12– 43 years) and 27.23 ± 8.61 years (range 12– 44 years), respectively. No significant differences were found between the groups with respect to age.
- Plasma vitamin D levels of the subjects with allergic rhinitis (mean 8.19 ± 4.34 ng/ml, range 3.0 -17.97 ng/ml) were significantly lower than the control group (mean 11.66 ± 5.93, range3.30 - 25.92 ng/ml) fig : 1

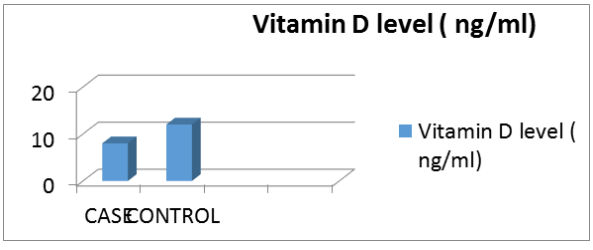

Fig : 1

- Serum total IgE levels of patients with allergic rhinitis mean 159.81 ± 202.23 IU/ml, range 1.77– 812.00 IU/ml) were significantly higher when compared to the control group (mean 35.59 ± 27.42, range 0.14–104.60 IU/ml)

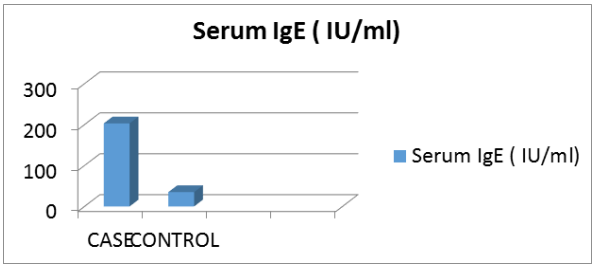

Fig : 2

- In AR, numerous inflammatory cells, including mast cells, CD4-positive T-cells, B-cells, macrophages, and eosinophils, infiltrate the nasal lining upon exposure to an inciting allergen (most commonly airborne dust mite fecal particles, cockroach residues, animal dander, molds, and pollens). During the early phase of an immune response to an inciting allergen the mediators and cytokines are released which trigger a further cellular inflammatory response over the next 4-8 h

(late phase inflammatory response) which results in recurrent symptoms (usually nasal congestion).[1]Infiltration of inflammatory cells is evident in both seasonal and perennial form, though the magnitude of these cellular changes is somehow different in seasonal and perennial AR.[2]

- The T-cells infiltrating the nasal mucosa are predominantly T helper (Th) 2 in nature and release cytokines (e.g. interleukin [IL]-3, IL-4, IL-5, and IL-13) that promote immunoglobulin E (IgE) production by plasma cells. IgE production, in turn, triggers the release of mediators, such as histamine and leukotrienes, which leads to arteriolar dilation, increased vascular permeability, itching, rhinorrhea (runny nose), mucous secretion, and smooth muscle contraction.[1]
- In our study, patients of AR showed deficiency in vitamin D indicated by mean vitamin D level of 8.19 ± 4.34 ng/ml. This result suggests the importance of assessing vitamin D levels in patients of AR. There are other studies recently coming in support of this fact as stated by Arshi et al. 2012 [3] The prevalence of severe vitamin D deficiency was significantly higher in patients with AR than the normal population. In a study performed by Moradzadeh et al. 2008 [4] the prevalence of severe vitamin D deficiency was significantly greater in patients with AR than the normal population (30% vs. 5.1%) demonstrating that there is an association between serum vitamin D levels and AR status.
- The improvement in the allergic status can be attributed to the immunomodulator effects of vitamin D on the immune system: Vitamin D regulates the activity of various immune cells, including monocytes, dendritic cells, T and B lymphocytes, as well as immune functions of epithelial cells.[5].
- Vitamin D affects B lymphocytes functions and modulates the humoral immune response including secretion of IgE.[6]
- The expression of pattern recognition receptor, which activates innate immune responses such as Toll-like receptors (TLRs) on monocytes are inhibited by Vitamin D, which leads to suppression of TLR-mediated inflammation.[7] Vitamin D induces autophagy in human macrophages, which helps in the defense against opportunistic infections.[8] The endogenous antimicrobial peptide in resident epithelial cells in the skin and lung are induced by Vitamin D, thereby strengthening the innate barriers against environmental allergens.[9,10]

CONCLUSION

- There is a correlation between serum vitamin D levels and Allergic Rhinitis.
- We found lower plasma vitamin D levels and higher serum total IgE levels in patients with allergic rhinitis.
- Although the relationship between vitamin D status and allergic diseases has been well established, there are few studies investigating whether vitamin D supplementation is effective in preventing or treating allergic disease.
- More studies with a larger number of patients should be conducted to validate the role of vitamin D supplementation therapy along with initial anti allergic treatment.

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