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ROLE OF VITAMIN D IN THERAPY OF ALLERGIC RHINITIS PATIENTS-A CROSS SECTIONAL STUDY

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ABSTRACT

Background: Severe allergic rhinitis has been associated with significant impairments in quality of life, sleep, and work performance. Recent evidence suggests that serum vitamin D3 has significantly correlated with the severity of allergic rhinitis (AR).

Aim: The objective of the study was to evaluate whether vitamin D supplementation has any role to reduce the severity of disease spectrum among allergic rhinitis patients.

Material & Methods: This prospective observational study was carried out in the department of otorhinolaryngology in a tertiary care hospital. 120 subjects with allergic rhinitis were evaluated for serum vitamin D levels. Pre-treatment total nasal symptom score (TNSS) were recorded for these patients. One group received anti-allergic while another group received vitamin D supplementation along with anti-allergic treatment. Post treatment TNSS scores and AR severity were calculated and analysed.

Results: Majority of the patients (35%) were 31-40 years age group, predominantly female (55.8%). Most of them (51.7%) were vitamin D deficiency (<20 ng/dl). The vitamin D deficiency was more pronounced in the patients having severe allergic rhinitis with TNSS > 11 were having mean vitamin D level 17.2 ng/ml. TNSS were significantly improved after successful vitamin D supplementation among allergic rhinitis patients ($p<0.05$).

Conclusion: patients with allergic rhinitis might be more vulnerable to have lower serum levels of vitamin D. Thus, significant reduction in the allergy symptom scores after vitamin D supplementation which alters the course of disease towards clinical improvement.

Keywords: Allergic rhinitis, Vitamin D level, Vitamin D supplementation, TNSS score

INTRODUCTION

Atrophic Rhinitis is a global health problem that causes major illness and disability worldwide, affecting patients' social life, sleep, and their school and work performance. Allergic rhinitis (AR) is a symptomatic disorder of the nose induced after allergen exposure through IgE-mediated inflammation of the membranes lining the nose [1]. Allergic rhinitis 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 [2, 3]. Allergic rhinitis is typically manifested by patients having nasal congestion, rhinorrhea, sneezing, and nasal itching as well as ocular redness, tearing, and itching. Nearly 50% of allergic rhinitis patients will experience symptoms for at least 4 months of the year. Allergic rhinitis, as a non-life threatening disease, has not been regarded as a serious health problem, despite the evidence suggesting it has important short-term and long-term health consequences [4]. Treatment options consist of drugs like anti-histamines, intranasal corticosteroids, decongestants, and more recently immunotherapy. In recent years, there has been worldwide increase in allergic diseases more so in developed countries and this has been associated with low vitamin D. Current lifestyle has led to people spending more times indoors, leading to less sun exposure and less cutaneous vitamin D production. Several studies have investigated the role of vitamin D in the treatment of allergic diseases and asthma; however the results are still controversial [5]. The prevalence varies among countries, probably because of geographic and aeroallergen differences [6, 7] 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 [8]. In recent years, the world wide increase in allergic diseases has been associated with low vitamin D. Schauber et al [9]. Stated that the association between low serum vitamin D levels and an increase in immune disorders is not coincidental. Growth in populations has resulted in people spending more times indoors, leading to less sun exposure and less cutaneous vitamin D production [10].

Aims & objectives: The primary objective of this research is to determine the role of vitamin D therapy in allergic rhinitis patients

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 8, 2024

MATERIALS AND METHODS

It was a cross sectional observational study conducted in the department of otorhinolaryngology in a tertiary care institute. A total of 120 participants diagnosed as allergic rhinitis clinically and in the laboratory during the study period were enrolled.

Inclusion criteria:

- Patients of ≥18 years of age
- Patients clinically diagnosed as Allergic rhinitis
- Patients who provided written informed consent for the study

Exclusion Criteria:

- Non-Allergic Rhinitis
- Associated Nasal co-morbidities like Nasal Polyposis, Sinusitis, Deviated Nasal Septum
- Associated Systemic co-morbidities affecting vitamin D levels
- Patients who not provide consent for the study

Allergic rhinitis was described as a positive skin prick test (SPT) or specific IgE with nasal symptoms.

All socio-demographic parameters (age, sex, Body mass index, education, socio-economic class, etc), medical history, physical examination and biochemical parameters were noted.

All study subjects underwent blood investigation for serum vitamin D levels using the fully automated electrochemiluminisense analyzer.

Vitamin D level 30-100ng/mL was considered normal

Vitamin D levels below 30ng/mL deficient.

Vitamin D3 (60000 IU/week) was supplemented in one group. After 2 months of therapy at follow up visit the total nasal symptom score (TNSS) was done in both the groups. The TNSS score (a runny nose, nasal congestion, sneezing, eye symptom and itchy nose) was assessed based on the severity of the symptoms.

Statistical analysis: Data were analysed by using SPSS 20 software (IBM SPSS Inc, Chicago, Illinois, USA). The chi-square test was used to compare two independent qualitative data. The significance level was set at $p<0.05$.

RESULTS

A total of 120 patients diagnosed as atrophic rhinitis were enrolled and analysed in this study. Majority of the patients (35%) were 31-40 years age group, predominantly female patients 67 (55.8%). Most of them (38.3%) belong to lower socio-economic class and maximum patients had overweight (35.8%). Most of them (51.7%) were vitamin D deficiency (<20 ng/dl) followed by (43.3%) vitamin D insufficiency [Table 1].

Table 1: Socio-demographic characteristics of allergic rhinitis patients

Socio-demographic features		Frequency (N=120)	Percentage
Age group (in years)	18-30	30	25%
	31-40	42	35%
	41-50	36	30%
	>50	12	10%
Gender	Male	53	44.2%
	Female	67	55.8%
Socio-economic class	Lower	46	38.3%
	Middle	41	34.2%
	Upper	33	27.5%
BMI (Kg/m^2)	Underweight	13	10.8%
	Normal weight	40	33.4%
	Over weight	43	35.8%
	Obese	24	20%
Vitamin D status	Normal (>30)	6	5%
	Insufficient (20-30)	52	43.3%
	Deficient (<20)	62	51.7%

The vitamin D deficiency was more pronounced in the patients having severe allergic rhinitis with TNSS > 11 and TNSS 7-10, were having mean vitamin D level 17.2 ng/ml and 19.7 respectively.

Table 2: Correlation of Total nasal symptom score with vitamin D levels

Total nasal symptom score	Mean Vit. D levels in ng/ml	No. of patients (N=120)
>11	17.2	52 (43.3%)
7-10	19.7	62 (51.7%)

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 8, 2024

3-6	28.1	6 (5%)
0-2	0	0 (0%)

TNSS were significantly improved after successful vitamin D therapy among allergic rhinitis patients ($p<0.05$).

Table 3: Distribution of patients according to severity- pre and post treatment

Total nasal symptom score	Pre‑treatment	After Vit D therapy	P value
>11	51 (42.5%)	1 (0.8%)	P < 0.001
7-10	62 (51.7%)	6 (5%)	
3-6	6 (5%)	51 (42.5%)	
0-2	1 (0.8%)	62 (51.7%)	

Symptoms of allergic rhinitis were statistically significantly reduced among female patients as compared to male after supplementation of vitamin D.

Table 4: Gender wise comparison of TNSS system between pre and post vitamin D supplementation

Gender	Total nasal symptom score (Mean±SD)		P value
	Pre-treatment	Post-treatment	
Male	11.34 ± 2.61	7.64 ± 1.09	P < 0.001
Female	12.25 ± 3.24	5.27 ± 0.92	P < 0.001

Overall vitamin D supplementation with anti-allergic treatment were significantly reduces TNSS score as compared to patients taking anti-allergic treatment alone.

Table 5: Overall effect of vitamin D supplementation on allergic rhinitis

Gender	TNSS (Mean±SD)		P value
	Pre-treatment	Post-treatment	
Anti-allergic treatment followed by vitamin D supplementation	10.54 ± 2.31	2.94 ± 1.53	P < 0.001
Anti‑allergic treatment only without vitamin D supplementation	11.15 ± 3.24	4.67 ± 1.78	P < 0.001

DISCUSSION

Vitamin D plays a crucial role in the management of moderate and severe allergic rhinitis patients. It was found that adding Vitamin D to nasal steroid spray showed statistically significant improvement in post-treatment.

The prevalence of severe vitamin D deficiency was significantly higher in patients with AR than the normal population; our study demonstrated a significant vitamin D deficiency among patients with allergic rhinitis, similar results reported by Moradzadeh et al [11] and Waleed M, et al [12].

We have found that allergic rhinitis were more common among female than male, concordance with the Bhardwaj, et al [13].

In the present study, vitamin D deficiency was more pronounced in the patients having severe allergic rhinitis with TNSS >11 and TNSS 7-10, mean vitamin D level of 17.2 ng/ml. This result supported by other studies performed by Saba Arshi et al [14] and Thakkar B, et al [15].

This study found a significant correlation between AR in females and levels of vitamin D in contrary to that a study done by Aryan Z, et al [16] observed significant correlation between AR in males and levels of vitamin D.

Current report demonstrating the significant association between serum vitamin D levels and allergic rhinitis status, in agreement with the Hembrom R et al [17] and H Q Tian, et al [18]

In our study it was found that pre-treatment TNSS and post vitamin D treatment TNSS of both groups were significantly differ ($p<0.05$), results correlates to the Kalpaklioglu, et al [19] and Modh, et al [20].

Present study found that vitamin D supplementation had a favorable impact on the treatment of allergic rhinitis with anti-allergic treatment. There was significantly more reduction in the total nasal symptom scores in the group which received vitamin D supplementation in addition to anti-allergic treatment as compared to the group which received treatment with anti-allergic treatment alone, these findings are comparable to many other studies: Velankar HK.et al [21] and Coban, et al [22]. The improvement in the allergic status can be attributed to the immunomodulator effects of vitamin D on the immune system.

ISSN: 0975-3583, 0976-2833 VOL 15, ISSUE 8, 2024

Vitamin D supplementation can be recommended for a faster onset of action of an intranasal steroid spray in allergic rhinitis patients with vitamin D deficiency.

CONCLUSION

We have concluded that prevalence of vitamin D deficiency was higher in allergic rhinitis patients There was highly significant reduction in the allergy symptom score (ASS) after supplementation of Vitamin D3. Thus vitamin D3 supplementation alters the course of allergic rhinitis towards clinical improvement

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