

Original Research Article

Study of vitamin C therapy in allergic rhinitis

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ABSTRACT

Background: Vitamin C has a therapeutic role in allergic rhinitis by reduction of oxidative stress and inflammation. The present study has been undertaken to evaluate the improvement or otherwise in the clinical manifestations of allergic rhinitis, following supplementation of this vitamin.

Methods: 40 subjects of allergic rhinitis were selected from the allergy clinics of Dayanand medical college and hospital. The study period was one and a half year. Vitamin C in the dose of 1 gm per day was administered in the case group and in the placebo group a sugar tablet was administered by the oral route. Plasma levels of ascorbic acid and its effect on the symptoms and signs of rhinitis were recorded.

Results: The mean duration of illness in the patients with allergic rhinitis was 10.15±3.4 years, with 25 patients having duration of less than 10 years, 10 patients were with of illness between 10 to 20 years and 5 having duration more than 20 years. The most common complaint in patients with allergic rhinitis was of nasal obstruction (57.5%).

All the patients who showed improvement had increase in plasma ascorbic after the respective treatment but not all the patients showing increase in plasma ascorbic acid post-treatment showed improvement.

Conclusions: Vitamin C ameliorates the signs and symptoms of allergic rhinitis by raising the plasma ascorbic acid levels.

Keywords: Vitamin C, Allergic rhinitis, Ascorbic acid, Clinical features

INTRODUCTION

Individuals with allergic rhinitis present with rhinorrhea, sneezing, nasal obstruction, anosmia and sometimes with associated, middle ear effusion, pharyngitis, laryngitis, irritation in the eyes, headache, asthma and gastrointestinal upset.¹

Antioxidants like vitamin C, tocopherols and carotenoids have a protective effect in allergic rhinitis and allergic sensitisation. Individuals with increased intake of vitamin C have fewer symptoms of allergic rhinitis. Dietary intakes of citrus fruit too have been shown to reduce the episode of shortness of breath. Moreover vitamin C supplementation enhances the resistance to

post exertional upper respiratory tract infections in athletes and reduces the severity in sedentary individuals.

Aim of the study

To study the effect of vitamin C on plasma ascorbic acid and features of allergic rhinitis.

METHODS

40 subjects of allergic rhinitis were selected from the allergy clinic of Dayanand medical college and hospital in a period of one and a half years (June 2009 to December 2010).

Study design

The present study was a prospective controlled study with the experimental group and the control group. The experimental group was divided into; group I: case group (20 subjects) and group II: placebo group (20 subjects).

Vitamin C was administered orally in the dose of 1 gm/day for 7 days and plasma levels were estimated after supplementation. Simultaneously their symptoms and signs were recorded and compared to previous findings. A sugar tablet was administered by oral route, twice a day for 7 days and the plasma levels were estimated and clinical manifestations compared.

Due care was taken that the subjects did not take any vitamin C supplementation, antihistamines or decongestants prior to plasma level estimation. Plasma levels of ascorbic acid was estimated by 2,6-dichlorophenol indophenols titration. Healthy 20 subjects without any complaints were included in the control group, for measuring levels of plasma ascorbic acid.

An inclusive criterion was patients with allergic rhinitis. Exclusive criteria were patients with fungal rhinosinusitis and patients on long duration steroid oral or nasal sprays.

Statistical analysis

All statistical calculations were done using statistical package of social sciences (SPSS) 17 version statistical program for Microsoft windows (SPSS Inc. 2008. version 17.0, Chicago).

RESULTS

The mean duration of illness in the patients with allergic rhinitis was 10.15±3.4 years, with 25 patients having duration of less than 10 years, 10 patients of illness between 10 to 20 years and 5 were having duration more than 20 years (Table 1).

Table 1: Duration of illness in patients with allergic rhinitis.

Duration of illness (years)	N (%)
<10	25 (62.5)
10-20	10 (25)
>20	5 (12.5)

The most common complaint in patients with allergic was of nasal obstruction (57.5%), the next in order of frequency was of rhinorrhea (47.5%), sneezing (37.5%) and postnasal dripping (27.5%) (Table 2).

Patients with allergic rhinitis showed overall relief with vitamin C treatment, with all patients having complaints

of sneezing, lacrimation, itching and malaise getting moderate to complete relief with the treatment (Table 3).

Table 2: The presenting complaints of patients with allergic rhinitis.

Symptoms	N (%)
Nasal obstruction	23 (57.5)
Rhinorrhea	29 (47.5)
Sneezing	15 (37.5)
Post nasal dripping	11 (27.5)
Lacrimation	10 (25)
Itching (palatal etc.)	10 (25)
Malaise	10 (25)
Headache	9 (22.5)
Associated nasobronchial allergies or asthma	7 (17.5)
Skin manifestation	3 (7.5)
Fever	3 (7.5)
Ear aches	1 (1.5)

Table 3: Response to vitamin C treatment in the case group as based clinical assessment.

Features	Total	Improvement N (%)	No improvement N (%).
Nasal obstruction	12	11 (91.66)	1 (8.33)
Rhinorrhea	10	8 (80)	2 (20)
Sneezing	8	8 (100)	0 (0)
Post nasal dripping	6	5 (83.33)	1 (16.66)
Lacrimation	4	4 (100)	0 (0)
Itching	6	6 (100)	0 (0)
Malaise	5	5 (100)	0 (0)
Headache	4	2 (50)	2 (50)
Associated nasobronchial allergies	3	2 (66.66)	1 (33.33)
Skin manifestation	1	0 (0)	1 (100)
Fever	2	1 (50)	1 (50)
Ear aches	1	0 (0)	1 (100)
Excessive mucus secretions	7	6 (85.71)	1 (14.28)
Pale mucosa	5	4 (80)	1 (20)

DISCUSSION

In present study the most common complaint in the patients with allergic rhinitis was nasal obstruction (57.5%). The next presentation in order of frequency was rhinorrhea (47.5%), sneezing (37.5%), post nasal dripping (27.5%), lacrimation, itching and malaise (25% each). Thacker analyzed 170 patients of allergic rhinitis and found that 27% had asthma, 8% had GIT symptoms, 13% had ear symptoms, 7% had hoarseness, 10% had pharyngitis, 23% headache, 7% had anosmia, and 7% had eye syndromes.¹ Wilson et al in their study of 26

patients, out of which 11 were atopic patients, found that nasal obstruction was the commonest symptom. Rhinorrhea and sneezing were more common in atopic patients.² Smith stated that four of five patients with allergic rhinitis have predominantly nasal symptoms.³ Symptoms of patients suffering from allergic rhinitis in the present study were compared with a study on nasal allergy by Craddock (Table 4).⁴

Table 4: Comparison of presenting complaints with Craddock et al study.

Symptoms	% of patients in present study	% of patients in study by Craddock
Nasal obstruction	57.5	60
Rhinorrhea	47.5	-
Sneezing	37.5	40
Post nasal dripping	27.5	40
Lacrimation	25.0	-
Itching (palatal/eyes)	25.0	15
Malaise	25.0	32.5
Headache	22.5	28.75
Associated nasobronchial allergy/asthma etc.	17.5	20
Skin manifestation	7.5	7.5
Fever	7.5	-
Ear aches	1.5	6.25

Analysis with reference to effect on clinical features of allergic rhinitis

The most common findings in patients with allergic rhinitis in our study was deviation in nasal septum (47.5%). Various other clinical features were excess mucus production (35%), hypertrophy of turbinate(s) (30%), pale blue mucosa (22.5%), mulberry cushion (20%) and polypi (5%). 25% of the patients had essentially normal examination. Thacker as early as 1946 found that 53% of patients had pale, boggy turbinates, 3% had hypertrophic rhinitis.¹ Craddock found that the patients presenting with nasal allergy most commonly had normal nasal examination (38.75%). Other features in order to frequency were excess mucus production (36.25%), pale mucosa (27.5%), and hypertrophy (13.75%), polypi (10%).⁴ Smith documented that 60% of the patients with allergic rhinitis had classically pale blue tone of nasal mucosa.³ Clinical findings in 40 patients of allergic rhinitis observed in this study were compared with a previous study (Table 5).

Analysis with reference to effect on plasma ascorbic acid levels

The mean plasma ascorbic acid level in control group was 20.45±3.58 mg/L. The mean plasma ascorbic acid

level in pre vitamin C case group was 15.45±3.59 mg/L and in post vitamin C treatment it was 23.20±5.55 mg/L. The placebo group had mean plasma ascorbic acid level as 13.85±2.92 mg/L before placebo treatment and this level was 15.15±3.67 after placebo treatment. The mean levels of plasma ascorbic acid as estimated in this study is analysed in (Table 6).

Table 5: Comparison of clinical features with study by Craddock et al.

Symptoms	% of patients in present study	% of patients in study by Craddock
Deviated nasal septum	47.5	-
Excess mucus production	35.0	36.2
Hypertrophy of turbinates	30	13.7
Essentially normal	25	38.7
Pale blue nasal mucosa	22.5	27.5
Vomerine cushion/Mulberry appearance	20.0	-
Polypi	5	10

Effect of treatment (vitamin C and placebo)

In our study patients with allergic rhinitis showed overall relief with vitamin C treatment, with all patients having complaints of sneezing, lacrimation, itching and malaise getting moderate to complete relief with the treatment. But with the placebo treatment there was no overall improvement in the symptoms of the patients.

Out of the 20 patients with allergic rhinitis in the case group, 17 (85%) improved with vitamin C treatment and 3 (15%) showed no improvement. But in placebo group 85% of the patients had no overall relief.

All the patients who had improvement with the respective treatment showed increase in the level of plasma ascorbic acid after the said treatment vis-à-vis- pre-treatment level. Thus, all the patients who showed improvement has increase in plasma ascorbic after the respective treatment but not all the patients showing increase in plasma ascorbic acid post-treatment showed improvement.

Mahindra et al found that the patients who were given vitamin C supplementation of 500 mg 1 BDx1 week had shown rise in plasma ascorbic acid and this coincided with subjective and objective improvement in allergic rhinitis.⁵

Wilson et al studied the effect of daily administration of vitamin C on symptom association and on the incidence,

duration, severity and total intensity of the symptom in common cold. They found that the vitamin C reduces symptom association and alters the frequency of toxic and catarrhal complexes. The severity of symptoms of cold were reflected more accurately by changes in plasma ascorbic acid concentrations.⁶ Baird et al study of 362 healthy subjects found that there was a 14 to 21 % reduction in total symptoms due to common cold that were supplemented with vitamin C. Ascorbic acid also increased the number of “episode-free” subjects.

Table 6: Statistical significance of plasma ascorbic acid in various groups.

Comparison of levels of plasma ascorbic acid in various groups	t value	P value
Pre vitamin C vs. control	4.299	p<0.01
Pre vs. post vitamin C cases	5.11	p<0.01
Post vitamin C vs. control	1.815	Not significant
Pre placebo vs. control	6.23	p<0.01
Pre placebo vs. post placebo	1.20	Not significant
Post placebo vs. control	4.506	p<0.01

Table 7: Effect of vitamin C and placebo treatment.

Group (n=20)	Improvement in patients N (%)	No Improvement in patients N (%)
After vitamin C treatment	17 (85%)	3 (15%)
After placebo treatment	3 (15%)	17 (85%)
Total	20	20

Table 8: Patients showing increase in plasma ascorbic acid.

Variables	Improved	No Improvement
Total patients with increase in plasma ascorbic acid		
33	20	13
Patients showing improvement in signs and symptoms.		
Total patients with improvement	Increase in plasma ascorbic acid	No increase in plasma ascorbic acid
20	20	0

Munjal et al recorded that in allergic rhinitis there is unsaturated state of body ascorbic acid, which is confirmed by increased utilization of ascorbic acid after supplementation. This unsaturated state of body was more in acute stage of disease.⁸ Iris Kompauer et al study found a negative association between plasma total carotenoids and the prevalence of allergic rhinitis, with odds ratio other single carotenoids, tocopherols and

vitamin C were unrelated to allergic rhinitis. Allergic sensitisation was negatively associated with plasma γ -tocopherol, no other antioxidant was significantly related to allergic sensitisation.⁹

Peters EM study provides evidence that vitamin C supplementation may enhance resistance to the post-race upper respiratory tract infections that occur commonly in competitive ultra-marathon runners and may reduce the severity of such infections in those who are sedentary.¹⁰ Vitamin C in mega doses administered before or after the appearance of cold and flu symptoms relieved and prevented the symptoms in the test population compared with the control group.¹¹

In the present study, patients with allergic rhinitis showed overall relief with vitamin C supplementation, with all subjects with complaints of sneezing, lacrimation, itching and malaise getting moderate to complete relief with the treatment. But with the placebo treatment there was no overall improvement in the symptoms of the patients. All the patients who showed improvement in their manifestations of allergic rhinitis had increase in the plasma ascorbic acid after the respective treatment.

CONCLUSION

Vitamin C ameliorates the signs and symptoms of allergic rhinitis, by raising the plasma ascorbic acid levels.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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