

# Estimation of Blood Absolute Eosinophil Count in Chronic Allergic Rhinosinusitis Before and After Treatment: A Prospective Study

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## Abstract

**Introduction:** Chronic rhinosinusitis is one of the most common visits to ENT surgeons. It is a persistent inflammation of the nose and paranasal sinuses for 12 weeks and longer. They can be managed medically with antihistamines, antibiotics, steroids acting both locally as well as topical application; if symptoms are refractory to medical management then surgery can be advocated to remove polyps to relieve the symptoms of nasal obstruction, sneezing, postnasal drip causing cough, and headache.

**Aim:** The present study evaluates the estimation of absolute eosinophil count in blood before and after treatment.

**Materials and Methods:** This is a prospective study of 42 patients with chronic allergic rhinosinusitis. The absolute eosinophil count in blood is estimated before starting medical management, and patients refractory to medical management are subjected to functional endoscopic sinus surgery, and absolute eosinophil count is estimated after 6 weeks post-surgery.

**Results:** The most common age group were in the 21–25 age group followed by the 26–30 age group comprising 10 and 7 patients, respectively. In the study, there were 22 female patients and 20 male patients. There was a reduction of absolute eosinophil count in the post-treatment period and improvement of symptoms.

**Conclusion:** Identifying allergy patients with sinusitis treating them with medical and surgical management of sinusitis in patient's results in a reduction of absolute eosinophil count with improvement in the quality of lifestyle in patients can be a simple test for prognosis of these allergic rhinosinusitis patients.

**Key words:** Allergy, Blood eosinophil count, Estimation, Rhinosinusitis

## INTRODUCTION

Chronic rhinosinusitis is one of the most common visits to ENT surgeons. It is a persistent inflammation of the nose and paranasal sinuses for 12 weeks and longer.<sup>[1,2]</sup> Eosinophil and their products are known to play an important role in rhinosinusitis as well cause asthma, and the measurement of blood and sputum levels of such markers of inflammation may provide information reflecting the evolution and control of the disease. However, the clinical usefulness

of these trials is still uncertain.<sup>[3]</sup> Chronic rhinosinusitis is classified into two subgroups with and without nasal polyps. Chronic rhinosinusitis without nasal polyps is more likely to be caused by a bacterial infection, whereas chronic rhinosinusitis with nasal polyps is more likely to present with blood eosinophilia and asthma.<sup>[4-7]</sup> They can be managed medically with antihistamines, antibiotics, steroids acting both locally as well as topical application, if symptoms are refractory to medical management then surgery can be advocated to remove polyps to relieve the symptoms of nasal obstruction, sneezing, postnasal drip causing cough, and headache. The present study evaluates the estimation of absolute eosinophil count before and after treatment.

## MATERIALS AND METHODS

This is a prospective study was conducted in the department of ENT at Madras Medical College in 42 patients with

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chronic allergic rhinosinusitis, enrolled for the study between July 2015 and September 2017. All the 42 patients were treated medically with antibiotics, antihistamines and nasal decongestant drop, steroid both topical as well as systemically for 3 weeks. Before starting medical treatment absolute eosinophil count CT scan of the para nasal sinus was taken in all of them. Twenty-five patients responded well with medical treatment with reduction of nasal symptoms of nasal obstruction, sneezing, headache, and nasal discharge, while 17 patients were refractory to medical management. The 17 refractory patients to medical management were subjected to functional endoscopic sinus surgery and measurement of absolute eosinophil count was done after 6 weeks postoperatively. Data were collected, presented as frequency, percentage, mean and standard deviation. Continuable variables were compared using paired sample t-test.

## RESULTS

In this study which comprises patients from 18 to 55 years of age, the most common age group were in the 21–25 age group followed by 26–30 years, age group comprising 10 and 7 patients, respectively [Table 1]. In the study, there were 22 female patients and 20 male patients [Figure 1].

The mean value of eosinophil count reduced significantly after treatment. In 45 patients treated medically, pre-treatment eosinophil count was  $646.44 \pm 170.58$  cells/ $\mu$ L and post-treatment eosinophil count was  $280.52 \pm 52.60$  cells/ $\mu$ L, the difference is statistically significant ( $P < 0.0001$ ). In 17 patients treated surgically, pre-treatment eosinophil count was  $615.65 \pm 207.95$  cells/ $\mu$ L and post-treatment eosinophil count was  $297.71 \pm 53.13$  cells/ $\mu$ L, the difference is statistically significant ( $P < 0.0001$ ) [Figure 2].

## DISCUSSION

Allergic rhinitis is a hypersensitivity reaction mediated by IgE to common allergens such as molds, pollen, house mites, and animal dander. Recruitment of many inflammatory cells and inflammatory mediators into the

nasal mucosa happens during this immunological insult. Nasal smear eosinophilia and blood absolute eosinophil count are simple, less invasive, and more economical tests in diagnosing allergic rhinitis.<sup>[8,9]</sup>

Anatomic variations, infection, genetic susceptibility, and local immunologic imbalance plays the main role in chronic rhino sinusitis.<sup>[10]</sup> It is suggested that blood eosinophilia and the extent of eosinophilic inflammation are related to the extent of sinonasal mucosal involvement, the severity of nasal disease, and the size of nasal polyps suggesting that chronic rhino sinusitis with and without nasal polyposis represents two ends of a spectrum of chronic inflammatory disease.<sup>[11]</sup> Differences in the expression of inflammatory mediators and cellular characteristics have been demonstrated in chronic rhino sinusitis and nasal polyposis mucosal tissue. Data suggest that eosinophils and related inflammatory products are the hallmark of nasal polyposis –associated inflammation.<sup>[10]</sup> However, scanty data are linking this relationship especially in India.

In our study, absolute eosinophil count monitoring was done in all the patients before starting treatment and after treatment. There was a reduction of the absolute

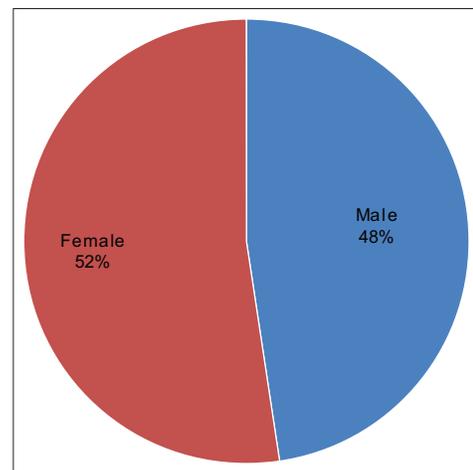


Figure 1: Gender distribution

Table 1: Age distribution

Age	Total	%	Female	%	Male	%
15–20	3	7.1	1	4.5	2	10.0
21–25	10	23.8	3	13.6	7	35.0
26–30	7	16.7	2	9.1	5	25.0
31–35	6	14.3	3	13.6	3	15.0
36–40	4	9.5	3	13.6	1	5.0
41–45	4	9.5	2	9.1	2	10.0
46–50	2	4.8	2	9.1	0	0.0
51–55	6	14.3	6	27.3	0	0.0

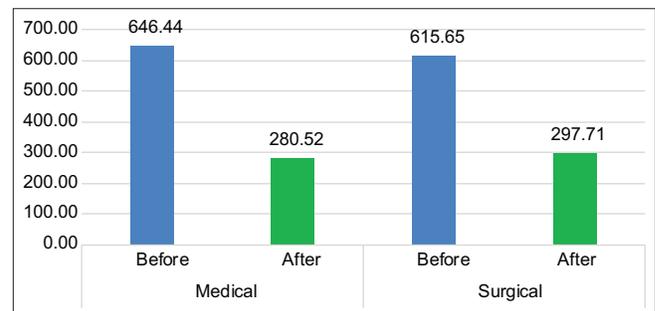


Figure 2: Comparison of eosinophil count pre- and post-treatment

eosinophil count after the treatment, an indication that medical management with antihistamines, antibiotics, steroids both systemic, and topical will reduce the symptoms, if refractory then functional endoscopic sinus surgery can be advocated to remove polyps and found to reduce the symptoms, while after 6 weeks there was a reduction of absolute eosinophil count in the blood. Functional endoscopic sinus surgery is proposed to have the beneficial effect of reducing eosinophil infiltration into the sinus mucosa by decreasing the endothelial L-selectin ligand level.<sup>[12]</sup> In our study, there was a reduction in absolute eosinophil in 17 patients who were refractory to medical treatment and there was a reduction of absolute eosinophil count 6 weeks post-sinus surgery, with the improvement of nasal symptoms. Also in the study by Ammu *et al.*, who have recommended that blood eosinophil percentage, absolute eosinophil count and MDCT PNS without contrast should be incorporated in the routine pre-operative workup of patients with CRS with extensive nasal polyposis and an intraoperative biopsy of the polyp should be sent for HPE as we have done in our study.<sup>[13]</sup>

## CONCLUSION

Identification of allergy patients with sinusitis is an important task that may be carried out by proper history, examination, blood investigation, and imaging CT scan of paranasal sinuses. Proper medical and surgical management of sinusitis in patients results in the reduction of absolute eosinophil count with improvement in the quality of lifestyle in patients.

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