



## COMPARATIVE STUDY OF TISSUE EOSINOPHILIA IN CHRONIC RHINOSINUSITIS WITH NASAL POLYP AND WITHOUT NASAL POLYP

### ENT

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### ABSTRACT

Chronic rhinosinusitis and nasal polyp are both prevalent medical disorders encountered in otorhinolaryngology practice. It leads to significant patient morbidity in terms of quality of life and decreased overall productivity. The aim of this study is to study the association of chronic rhinosinusitis with nasal polyps, nasal allergy and tissue eosinophilia.

The study was conducted on 50 patients with chronic rhinosinusitis admitted in the Dept of ENT, Govt Medical College, Trivandrum. Chronic rhinosinusitis and nasal polyps were found predominantly in the 20-50yrs age group. Chronic Rhinosinusitis with nasal polyps were associated with higher grades of tissue eosinophilia compared to chronic rhinosinusitis without nasal polyps. Symptoms of allergic rhinitis and tissue eosinophilia did not show any correlation clinically or statistically. There was no significant association between allergic rhinitis and chronic rhinosinusitis or nasal polyps.

### KEYWORDS

Chronic rhinosinusitis, Nasal polyp, Tissue eosinophilia

### BACKGROUND

The term rhinosinusitis refers to a group of disorders characterized by inflammation of mucosa of nose and paranasal sinuses. Eosinophilic inflammation has been associated with formation of nasal polyps. Nasal polyp is a multifactorial disease process resulting in a common pathology. Better understanding of pathophysiology has resulted in better protocols for treatment. As most polyps are characterized by tissue eosinophilia it has been the belief for decades that allergy is a significant cause of nasal polyps. However this view has been challenged because most studies failed to show high occurrence of positive skin test to inhaled allergants in patient with polyps than in general population.

Hence this study attempts to compare the inflammatory process involved in chronic rhinosinusitis and nasal polyps in terms of tissue eosinophilia and also to assess the occurrence of allergic rhinitis in patients with chronic rhinosinusitis and nasal polyps, in relation to the different grades of eosinophilic inflammation.

### MATERIALS AND METHODS

50 cases of chronic rhinosinusitis, with or without, polyp admitted and treated (all underwent surgery) in the Dept. of ENT, Medical College Hospital, Trivandrum during the period June 2007 to January 2009 are included in the present study

### Inclusion criteria

1. Nasal polyps whether ethmoidal or antrochoanal, bilateral or unilateral were taken into consideration,
2. Recurrence cases were also taken in the study.
3. Patients in all age groups admitted for surgery with chronic rhinosinusitis or chronic rhinosinusitis with nasal polyp were considered.

### Exclusion criteria

1. Rhinosporidiosis with polypoidal change
2. Case of nasal polyps clinically, which on histopathological examination were found to be neoplasms.

### Data collection

A detailed history of the patient was taken, Special emphasis was given to symptom of allergic rhinitis based on symptom score.

### Symptom score in allergic rhinitis

- 0 None or absent Symptom was not evident
- 1 Mild Symptom was definitely present but was not bothersome
- 2 Moderate Symptom was bothersome, but did not markedly interfere with daily activities.
- 3 Severe Symptom disturbed most daily activities.

Running nose 0 1 2 3

Sneezing 0 1 2 3

Nasal block 0 1 2 3

Ocular symptoms 0 1 2 3

(Excessive lacrimation, itching, redness of eyes)

Symptom score of each patient is calculated by adding individual symptom score and graded from 1 to 15.

History of drug allergy, bronchial asthma, food allergy, atopic dermatitis and other allergies were also taken into consideration.

A detailed clinical evaluation and examination of the patient was also done. General examination was done, Detailed ear, nose and throat examination was done. All relevant details were entered in the proforma.

Apart from the routine preoperative investigations, radiological evaluation was done. X ray Paranasal sinuses was taken for all cases. CT scan of nose and paranasal sinuses was taken by patients who were to undergo endoscopic sinus surgery.

Once the surgical procedure (which is mostly intranasal ployectomy, endoscopic sinus surgery and Caldwell luc operations) was over the tissue is collected in 10 % formalin and taken to pathology laboratory for histopathological examination.

### INTERPRETATION

#### Examination of slide under oil immersion

Entire smear is examined and select areas where cells are in higher density and even distribution, Identify cells by staining characteristics. Count 100 cells and eosinophil count is expressed in percentage.

#### Grading of Eosinophil count

Grade 1 No eosinophil seen

Grade 2 Occasional eosinophil seen

Grade 3 Eosinophils scanty, but scattered

Grade 4 Approximately 1/4 of the calls are eosinophils

Grade 5 Approximately 1/3 of the cells are eosinophils

Grade 6 Approximately 1/2 of the cells are eosinophils.

### DATA ANALYSIS

Qualitative data is expressed in percentage and proportion, quantitative data is expressed in mean and standard deviation. Association is measured by chi square test. Data entered in Microsoft Excel and analysed using SPSS.

**Table 1 - Percentage distribution of the sample according to age.**

Age	Count	Percent
21-30	8	16.0
31-40	19	38.0
41-50	23	45.0
Average		38.14

Among 50 cases, the maximum number of cases are in the 41-50 year

age group. (45%) followed by 38% cases in the 31-40 year age group.

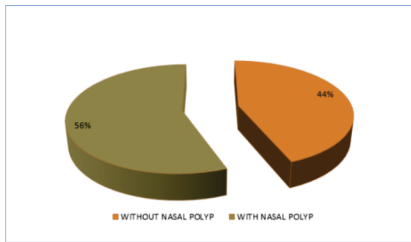
**Table 2 - Percentage distribution of the sample according to sex**

Sex	Count	Percent
Male	33	66.0
Female	17	34.0

In this study 66% (33 cases) were males and 34% (17 cases) were females which gives a male : female ratio of 2:1.

**Table 3 - Percentage distribution of the sample according to the type of Chronic Rhinosinusitis**

Chronic Rhinosinusitis	Count	Percent
Without Nasal Polyp	22	44.0
With Nasal Polyp	28	56.0

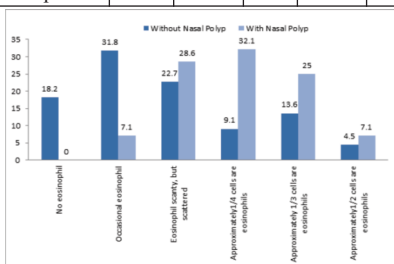


**Figure - 1**

Of the 50 cases studied 22 were chronic rhinosinusitis without nasal polyp (44%) and 28 were chronic rhinosinusitis with nasal polyp (56%).

**Table 4 - Relationship between type of chronic rhinosinusitis and grade of tissue eosinophilia for total sample.**

Eosinophilia Grade	Chronic Rhinosinusitis				Mann-Whitnes U	
	Without Nasal Polyp		With Nasal Polyp		Z	P
	Count	Percent	Count	Percent		
No eosinophil	4	18.2	0	0.0		
Occasional eosinophil	7	31.8	2	7.1		
Eosinophil scanty, but scattered	5	22.7	8	28.6		
Approximately 1/4 cells are eosinophils	2	9.1	9	32.1	2.94**	0.003
Approximately 1/3 cells are eosinophils	3	13.6	7	25.0		
Approximately 1/2 cells are eosinophils	1	4.5	2	7.1		



**Figure - 2**

The eosinophilia grades of chronic rhinosinusitis without nasal polyp is mostly grade 1 to 3. Mostly grade 2 (31.8%) followed by grade 3 (22.7%) whereas eosinophilia grades of chronic rhinosinusitis with nasal polyp is more, among grades 3-5. Mostly grade 4 (32.1%) followed by grade 3 (28%). The P value is 0.003 which suggests that the association of nasal polyp with tissue eosinophilia is statistically significant.

**Table 5 - Relationship between type of chronic rhinosinusitis and grade of tissue eosinophilia in the age group of 21-35 years**

Eosinophilia Grade	Chronic Rhinosinusitis				Mann-Whitnes U	
	Without Nasal Polyp		With Nasal Polyp		Z	P
	Count	Percent	Count	Percent		
No eosinophil	2	28.6	0	0.0		
Occasional eosinophil	4	57.1	1	9.1		
Eosinophil scanty, but scattered	0	0.0	2	18.2		
Approximately 1/4 cells are eosinophils	0	0.0	5	45.5	2.51**	0.11
Approximately 1/3 cells are eosinophils	1	14.3	3	27.3		
Approximately 1/2 cells are eosinophils	0	0.0	0	0.0		

Eosinophilia Grade	Chronic Rhinosinusitis				Mann-Whitnes U	
	Without Nasal Polyp		With Nasal Polyp		Z	P
	Count	Percent	Count	Percent		
No eosinophil	2	28.6	0	0.0		
Occasional eosinophil	3	20.0	1	5.9		
Eosinophil scanty, but scattered	5	33.3	6	35.3		
Approximately 1/4 cells are eosinophils	2	13.3	4	23.5	2.02	0.044
Approximately 1/3 cells are eosinophils	2	13.3	4	23.5		
Approximately 1/2 cells are eosinophils	1	6.7	2	11.8		

\*\* significant at 0.05 level

**Table 6 - Relationship between type of chronic rhinosinusitis and grade of tissue eosinophilia in the age group of 36-50 years**

Eosinophilia Grade	Chronic Rhinosinusitis				Mann-Whitnes U	
	Without Nasal Polyp		With Nasal Polyp		Z	P
	Count	Percent	Count	Percent		
No eosinophil	2	28.6	0	0.0		
Occasional eosinophil	3	20.0	1	5.9		
Eosinophil scanty, but scattered	5	33.3	6	35.3		
Approximately 1/4 cells are eosinophils	2	13.3	4	23.5	2.02	0.044
Approximately 1/3 cells are eosinophils	2	13.3	4	23.5		
Approximately 1/2 cells are eosinophils	1	6.7	2	11.8		

\*\* significant at 0.05 level

From the above table it can be seen that the predominance of lower eosinophil grades in chronic rhinosinusitis without polyp is unaffected by age. 57% cases are of eosinophilia grade 1 in 21 to 35 year age group and 53.3% cases have eosinophilia grade 1 or 2 in 36 to 50 year age group.

So also the predominant occurrence of higher eosinophil grades in chronic rhinosinusitis with polyp is independent of age. 45.5% cases have grade 4 eosinophilia in 21 to 35 year age group and 58.8% cases have eosinophilia grades 4 or 5 in the 36 to 50 year age group.

**Table 7 - Relation between grade of tissue eosinophilia and age for patients having chronic rhinosinusitis with nasal polyp**

Eosinophilia Grade	age				Mann-Whitney U	
	21-35		36-50		Z	P
	Count	Percent	Count	Percent		
Occasional eosinophil	1	9.1	1	5.9		
Eosinophil scanty, but scattered	2	18.2	6	53.3		
Approximately 1/4 cells are eosinophils	5	45.5	4	23.5		
Approximately 1/3 cells are eosinophils	3	27.3	4	23.5	0.049	0.961
Approximately 1/2 cells are eosinophils	0	0.0	2	11.8		

45.5% of patients in the 21 to 35 year age group have eosinophilia grade 3 followed by grade 4 in 27.3% whereas 47% of patients in the 36 to 50 year age group had eosinophilia grades 4 or 5.

The p value is 961 and hence there is no statistically significant association between age and grade of tissue eosinophilia in nasal polyp.

**Table 8 - Comparison of allergy symptom score with grade of eosinophilia**

Ensinophilia Grade	Mean	SD	N	Kruskal Wallis Test	P
No eosinophil	3.8	2.9	4	8.79	0.119

Occasional eosinophil	4.2	1.9	9		
Eosinophil scanty, but scattered	4.3	1.7	13		
Approximately 1/4 cells are eosinophils	3.9	1.7	11		
Approximately 1/3 cells are eosinophils	4.8	2.1	10		
Approximately 1/2 cells are eosinophils	2.0	0.0	3		

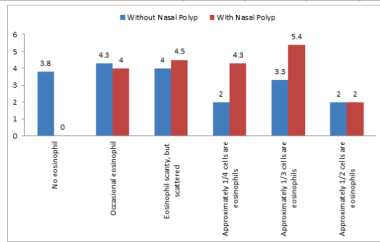


Figure-3

The mean symptom score associated with grade 1 eosinophilia is 3.8 and mean symptom score associated with grade 6 eosinophilia is 2. The p value is 0.119 and hence there is no statistically significant association between allergy symptom score and tissue eosinophilia.

Table 9 - Relationship between allergy symptom score and type of chronic rhinosinusitis

Chronic Rhinosinusitis	Mean	SD	N	Mann-Whitney U	
				Z	p
Without Nasal Polyp	3.7	1.9	22	1.79	0.074
With Nasal Polyp	4.5	1.8	28		

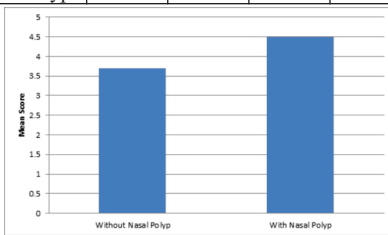


Figure-4

The mean allergy symptom score in chronic rhinosinusitis without nasal polyp is 3.7 and the mean allergy symptom score in chronic rhinosinusitis with nasal polyp is 4.5. Hence it is assumed that the incidence of allergy is not significant in chronic rhinosinusitis and nasal polyps.

**DISCUSSION**

This study included 50 cases of chronic rhinosinusitis with and without nasal polyp, admitted and treated (all underwent surgery) in the Department of ENT, Medical College Hospital, Trivandrum from June 2007 to January 2009.

All the 50 cases were adults. Most of the cases were in the 41 to 50 year age group (46%) followed by 38% cases in the 31 to 40 year age group. According to Drake Lee<sup>35</sup>, nasal polyp are a disease of adults and the incidence every 10 years is equal between the ages 30 to 60 years and then the chance of developing polyps decreases.

In our study 66% cases were males and 34% females making male female ratio 2:1. This compares with the figures quoted by Drake Lee<sup>35</sup> which according to him varies from 2:1 to 4:1. Of the 50 cases studies, 22 were chronic rhinosinusitis without nasal polyp (44%) and 28 were chronic rhinosinusitis with nasal polyp (56%).

The eosinophilia grades of chronic rhinosinusitis without nasal polyp is mostly grade 1 to 3. Mostly grade 2 (31.8%) followed by grade 3 (22.7%) whereas the eosinophilia grades of chronic rhinosinusitis with nasal polyps is more, among grades 3 to 5. Mostly grade 4 (32.1%) followed by grade 3 (28%).

In a retrospective study of 55 patients by Dr, S,E, Kountakis<sup>80</sup>, he has found that chronic rhinosinusitis with a greater degree of tissue eosinophilia was associated with nasal polyp and a greater severity of

disease.

Klinikinal Tyrimai in 2008 studied 121 patients with chronic rhinosinusitis of which, nasal polyp 84 (69%) Asthma 48 (39.6%) allergic rhinitis 45.5%, 44 patients with chronic rhinosinusitis having nasal polyp and asthma were characterized by older age., greater duration of symptoms, more severe sinus disease on CT and greater eosinophil count.

The predominance of lower eosinophil grades in chronic rhinosinusitis without polyps is found in all age groups from 21-50 years. 57% cases have eosinophilia grad 1 in 21-35 years age group and 53.3% cases had eosinophilia, grade 1 or 2 in 36-50 years age group. So also the predominant occurrence of higher eosinophil grades in chronic rhinosinusitis with polyps holds in all age group from 21-50 years. 58.8% cases have Eosinophilia grade 4 or 5 in 36-50 years age group.

Also majority of (45.5%) patients in 21-35 years age group with nasal polyp had Eosinophilia grade 3 followed by Eosinophilia 4 in 27.3% patients whereas 47% patients in 36-50 years age group with nasal polyp had Eosinophilia grades 4 or 5. The p value is 0.961 and hence there is no statistically significant association between age and grade of tissue Eosinophilia in nasal polyp.

The mean Allergic rhinitis symptom score associated with grade 1 eosinophilia is 3.8 and the mean symptom score associated with grade 6 eosinophilia is 2. The p value is 0.1119 and hence there is no statistically significant association between allergy symptom score and tissue eosinophilia.

Fardin Eghtedari in 2007 studied 25 patients with nasal polyps. Skin prick test was positive in 48% patients. Tissue eosinophil count >50% was found in 75% skin prick positive and 69.2% skin prick negative patients. Tissue eosinophil >50% was found in 68% of patients with typical allergic symptoms as well as 75% patients with out allergic symptoms. Considering these results they have concluded that having a high eosinophil count in patients with nasal polyp does not indicate that polyp is allergic.

The mean allergy symptoms score in chronic rhinosinusitis without nasal polyps is 3.7 and the mean allergy symptoms score in chronic rhinosinusitis with nasal polyp is 4.5. Hence it is assumed that incidence of allergy is similar in chronic rhinosinusitis with and without nasal polyp.

S Berrettini studied 40 adults with perannial Allergic rhinitis and found sinusitis in 67.5% of allergic patients and 33.4% of controls with a statistically significant difference between the two.

Caplin and Coworkers examined 3000 consecutive atopic patients and found that only 0.5% had polyps. Bunnag and Coworkers reported a 4.5% incidence of nasal polyp in 300 patients with allergic rhinitis. Drake Lee reported that positive skin test results are no common than expected in patients with nasal polyp (25%) , making presence of allergy appear to be coincidental.

**CONCLUSION**

Chronic rhinosinusitis and nasal polyps are found predominantly in the 20- 50yrs age group. Male: Female ratio is 2:1 Chronic Rhinosinusitis with nasal polyps are associated with higher grades of tissue eosinophilia compared to chronic rhinosinusitis without nasal polyps. There is no statistically significant relationship between age and grade of tissue eosinophilia in nasal polyps. Symptoms of allergic rhinitis and tissue eosinophilia do not show any correlation clinically or statistically. There is no significant association between allergic rhinitis and chronic rhinosinusitis of nasal polyps. The ability to better categorise the common condition chronic rhinosinusitis a good step toward targeted treatment. For example, patients with higher levels of tissue eosinophilia may benefit from more anti-inflammatory agents over longer periods.

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