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Correlation between blood eosinophil count and nasal smear eosinophils with severity of clinical score in allergic rhinitis patients- A cross sectional study

Authors
Dr Jayagar Prabakaran, MBBS, MPH(USA), MS[1], Dr Elango Dhanapal, DLO, DNB[2], Prof. Dr Vincent Prasanna, MS[3], DLO, Dr Sangheetha Jayagar, MBBS[4]
[1]Assistant Professor of ENT, Tagore Medical College & Hospital, Chennai-127
[2]Associate Professor of ENT, Tagore Medical College & Hospital, Chennai-127
[3]Professor and HOD- Dept. of ENT, Tagore Medical College & Hospital, Chennai-127
[4]General Medical Practitioner, Dr. Jayagar ENT & General Clinic, Chennai-78, India
Corresponding Author
Dr Elango Dhanapal, DLO, DNB
Email: *drjayagar@gmail.com*, Contact No: 9445888767

Abstract
Background: *Allergic rhinitis is a common chronic ENT condition which affects the quality of life and causes poor performance in school and at work. Since allergic rhinitis has no single gold standard test, nasal smear eosinophilia and blood absolute eosinophil count could serve as an aid in diagnosis of this chronic disorder.*
Objective: *To analyze the correlation between blood absolute eosinophil count and nasal smear eosinophilia with clinical score severity in Allergic rhinitis patients.*
Material and Methods: *Patients aged between 15 and 60 years with a clinical diagnosis of allergic rhinitis were enrolled after obtaining informed written consent. Clinical data recorded and all patients underwent blood investigation for blood absolute eosinophil count and nasal smear for eosinophil count.*
Results: *The clinical severity had a strong positive correlation with nasal smear eosinophil count (p value 0.001) when compared with that of blood absolute eosinophil count (p value 0.062).*
Conclusion: *Nasal smear cytology for eosinophils serves as a simple, rapid, semi-invasive investigation for allergic rhinitis diagnosis and can be implemented routinely in regular day to day practice.*
Keywords: *Allergic rhinitis, Absolute eosinophil count, nasal smear eosinophilia.*

Introduction

Allergic rhinitis is a common chronic disorder of the upper respiratory tract with a slight male preponderance. Its prevalence ranges between 10% and 20%[(1)]. Allergic rhinitis can be perennial or seasonal and common symptoms include nasal itching, nasal congestion, sneezing and rhinorrhea[(2)]. Diagnosis is often made out by a detailed history, clinical examination and few diagnostic tests like SPT (Skin Prick Test), RAST (Radio-Allergo Sorbent Assay), serum IgE antibodies and ELISA[(3)]. It is difficult for most of the patients with allergic rhinitis to undergo these diagnostic tests as they are expensive.

The objective of this study is to find out the correlation between blood absolute eosinophil

count and nasal smear eosinophilia with clinical score severity in Allergic rhinitis, as these investigations are simple, less expensive and can be used as an alternative diagnostic test for allergic rhinitis.

Materials and Methods

A cross-sectional study was conducted in 100 patients with a pre-registered diagnosis of allergic rhinitis who attended the out-patient section of the department of ENT at a tertiary care center. Informed consent obtained from participant patients. Patients aged between 15 and 60 years were enrolled.

Inclusion Criteria

1. Patients who satisfy allergic rhinitis diagnostic criteria.
2. Patients not using steroid/antihistamines for the past one month.

Exclusion criteria

1. Patients with deviated nasal septum or any structural variants in nose.
2. Patients with concomitant chronic sinusitis, chronic otitis media and chronic tonsillitis
3. Pregnant women
4. Snuff powder users

Detailed history was taken and clinical examination done. Severity of symptoms was classified based on ARIA (Allergic Rhinitis and its Impact on Asthma) classification of allergic rhinitis[4]. All patients underwent blood investigation for Absolute eosinophil count and nasal smear examination for eosinophil count.

Blood absolute eosinophil count was further sub-classified into five grades.

Grade I – 400 cells/cu.mm; Grade II – 101-250 cells/cu.mm; Grade III – 251-500 cells/cu.mm; Grade IV – 501- 750 cells/cu.mm and Grade V- >750cells/cu.mm[5].

Nasal smear was prepared from mucous membrane over nasal septum and inferior turbinate using sterile cotton swab, fixed in 95% ethanol over a glass slide and stained with eosin-hematoxylin. Slides were read by a trained pathologist for nasal smear eosinophilia.

Nasal Smear Eosinophilia Grading[5]

Rare - <5% of total leucocytes,
Mild- 5-15% of total leucocytes,
Moderate- 16-25% of total leucocytes,
Severe- >25% of total leucocytes.

Results

Table 1: Demographic and clinical variables of study group

S.No.	Variable		(N=100)%
1.	Age Distribution	15-30	43%
		31-45	38%
		46-60	19%
2.	Symptoms(ARIA Classification)	Intermittent	24%
		Persistent	30%
		Mild	28%
		Moderate-Severe	18%
3.	Blood Absolute Eosinophil Count (cells/cu.mm)	<100	8
		101-250	31
		251-500	41
		501-750	11
		>750	9
4.	Nasal smear eosinophils (% of total leucocyte count)	Rare	18
		Mild	30
		Moderate	30
		Severe	22

Table 2: Correlation between clinical severityof allergic rhinitis with blood Absolute eosinophil count

Clinical Severity of Allergic rhinitis	Blood Absolute Eosinophil Count (cells/cu.mm)					Chi Square Value	p-value
	<100	101-250	251-500	501-750	>750		
Intermittent	3	4	11	3	3	17.869	0.062
Persistent	3	13	13	1	0		
Mild	0	12	8	4	4		
Moderate-Severe	2	2	9	3	2		

Table 3: Correlation between clinical severity of allergic rhinitis with nasal smear eosinophilia

Clinical Severity of Allergic Rhinitis	Nasal Smear Eosinophilia				Chi-square value	p-value
	Rare	Mild	Moderate	Severe		
Intermittent	11	5	1	7	43.483	0.001
Persistent	2	16	10	2		
Mild	1	7	15	5		
Moderate-Severe	4	2	4	8		

Demographic and clinical variables of the study group are depicted in Table 1. Out of the affected people 43% were between 15 and 30 years and 56% were males. Most common presenting symptom was rhinorrhea (97%) followed by sneezing (82%) and nasal obstruction (41%). Two-third of them had blood absolute eosinophil count <500 cells/cu.mm and 52% had nasal smear eosinophilia of grade moderate to severe. There was a statistically significant correlation between nasal smear eosinophil count and clinical severity score (p value 0.001) Table-3, whereas majority of patients had low blood absolute eosinophil count with a concurrent moderate-severe clinical symptoms (p value 0.062) Table2. Thus nasal smear eosinophilia is a more reliable indicator than absolute eosinophil count in diagnosing allergic rhinitis.

Discussion

Allergic rhinitis is a hypersensitivity reaction mediated by IgE to common allergens like molds, pollen, house mites, animal dander, etc. Recruitment of many inflammatory cells and inflammatory mediators into the nasal mucosa happens during this immunological insult[6]. One such marker of allergic rhinitis is increased eosinophils in nasal smear/brush/biopsy of nasal mucosa. Diagnosis of allergic rhinitis is confirmed by investigations like Skin Prick Test, ELISA, RAST and serum IgE antibody levels which are expensive and unavailable in majority of healthcare settings[7]. Nasal smear eosinophilia and blood absolute eosinophil count are simple, less invasive and more economical tests in diagnosing allergic rhinitis. Henceforth we in our study have evaluated the relationship between nasal smear eosinophilia and blood absolute eosinophil count with the clinical severity of allergic rhinitis.

A general belief is that allergic rhinitis severity usually correlates with blood absolute eosinophil count levels. In our study majority of patients irrespective of the severity of clinical disease had blood absolute eosinophil count levels of <500cells/cu.mm. Chowdary et al[8] in his study had also demonstrated similar findings where more than 90% of allergic rhinitis patients had blood absolute eosinophil count of <440cells/cu.mm. Similar findings were observed by Jagdeeshwar et al[9] and he concluded that allergic rhinitis patients with only nasal symptoms had a normal blood absolute eosinophil count levels, whereas those with nasal and respiratory symptoms had increased blood absolute eosinophil count levels. Hence blood absolute eosinophil count is a reliable marker when allergic rhinitis is associated with respiratory system involvement.

Nasal smear eosinophilia had a statistically significant correlation with clinical severity of allergic rhinitis with a p-value of 0.001 in our study. Studies done by Olusesi et al[10] and Chanda et al[11] also showed a directly proportional relationship between severity of clinical symptoms and nasal smear eosinophil count. Inference from the above discussion is that Nasal smear eosinophilia is a better predictor than blood absolute eosinophilia in diagnosing allergic rhinitis.

Conclusion

Nasal smear eosinophilia being a simple, economical and less invasive investigation has good correlation with severity of allergic rhinitis than blood absolute eosinophil count and hence can be implemented clinically in regular day to

day practice. Further studies are needed involving larger sample size to find out the sensitivity and specificity of Nasal smear eosinophilia in allergic rhinitis.

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