Section: Otorhinolaryngology

Original Research Article

A STUDY OF NASAL CYTOLOGY IN PATIENTS WITH ALLERGIC RHINITIS- A DIAGNOSTIC TOOL

Avanija Lakshmi T[1], Raghu Chanakya KS[1], Monica M[2]

[1]*Department of Otorhino laryngology, GITAM Institute of Medical Sciences and Research, GITAM Deemed to be University, Visakhapatnam, Andhra Pradesh, India.*
[2]*Department of Pathology, GITAM Institute of Medical Sciences and Research, GITAM Deemed to be University, Visakhapatnam, Andhra Pradesh, India.*

Received *: 06/09/2025*
Received in revised form *: 17/10/2025*
Accepted *: 05/11/2025*

Corresponding Author:
Dr. Raghu Chanakya KS,
Department of Otorhino laryngology, GITAM Institute of Medical Sciences and Research, GITAM Deemed to be University, Visakhapatnam, Andhra Pradesh, India..
Email: drraghuchanakyaent@gmail.com

DOI: 10.70034/ijmedph.2025.4.242

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (4); 1352-1355

ABSTRACT

Background: Allergic rhinitis is a condition which can involve any age group from children to old age and it is a part of atopic march. Though there are many ways to diagnose this condition, we still face a challenge in diagnosing and treating allergic rhinitis. The main purpose of this study was to find a simple test to identify allergic rhinitis and its severity. In this study we are focusing more on nasal smears for eosinophils in allergic rhinitis patients.
Materials and Methods: A total of fifty patients who are skin prick tested positive to any one of the known aeroallergens were included as cases and 50 healthy subjects were included in control group without any symptoms of allergic rhinitis and skin prick test negative. All of them were subjected to nasal scrape cytology and mucosal scrapings were acquired by scraping the surfaces of middle part of inferior turbinate using a cytobrush. Standard procedure of fixing and staining was employed to study patterns and profile of different cells like eosinophils. The nasal eosinophils were studied using a light microscope and semi quantitative score of nasal eosinophils was used.
Results: Out of 50 patients in the study group, 19 (38%) and 14(28%) of patients showed grade 1+ and grade 2+ respectively. Whereas in control group 86% of subjects showed Grade 0. The difference in the study group and control group for nasal eosinophilia was found to be statistically significant.
Conclusion: Nasal scrape cytology can also be used as a modality in diagnosing patients with allergic rhinitis.
Keywords: Allergic rhinitis, nasal scrape cytology, mucosal scraping, eosinophils.

INTRODUCTION

Rhinitis is one of the most common chronic conditions for which medical care is sought. It is a heterogenous disorder resulting in inflammation of the nasal mucosa and characterised by symptoms of sneezing, rhinorrhoea, nasal congestion and nasal itching.an estimated population of 400 million people worldwide suffer from allergic rhinitis and another 200 million suffer from non allergic rhinitis. Although rhinitis is not life – threatening, it can significantly impact one's quality of life and is responsible for loss of work and school productivity.[1] Allergic Rhinitis (AR) is caused by immunologic sensitisation to one or more environmental allergens, which leads to production of allergen – specific IgE antibodies that bind high affinity IgE receptors on the surface of mast cells and basophils. Upon re-exposure, there will be release of various mediators from the inflammatory cells resulting in the symptoms. The Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines classify AR both by a temporal pattern (intermittent vs. persistent) and by severity (mild vs. moderate-severe).[2] Non allergic Rhinitis (NAR) is a heterogenous group of disorders involving symptoms such as sneezing, rhinorrhoea, nasal congestion and post- nasal discharge without any allergic trigger.[3] The pathogenesis for NAR remains unknown and it is said to be because of abnormalities in the autonomic nervous system. There are many tests to separate allergic from non-allergic rhinitis. Skin Prick Test (SPT) and Nasal Cytology are one among them. SPT is a bioassay to determine the presence of

specific IgE antibodies on the surface of mast cells. A positive SPT is elicited when a specific allergen is introduced into the skin and a wheal and flare reaction develop over a period of 15 – 20 minutes.[4] The basis for using nasal cytology as a tool to diagnose allergic rhinitis is because of IL 5 there will clonal expansion of eosinophils in blood and it is accompanied by the cellular infiltration of the nasal mucosa.so, we the current knowledge on allergic rhinitis we did a study wherein nasal scrape cytology was done for eosinophils count in 50 proven cases of allergic rhinitis and 50 normal individuals. So, in the present study we tried to assess the diagnostic value of nasal smear eosinophilia for allergic rhinitis.

MATERIALS AND METHODS

In the present study a total of 100 subjects between the age group of 18 – 50 years who are attending the otorhinolaryngology outpatient department are selected. Out of which 50 subjects are clinically diagnosed patients of allergic rhinitis based on the symptoms and these patients are sensitised to one of the known aero allergens on Skin Prick Test, i.e., these are the subjects with Skin Prick Test positive for any one of the known aero allergen like House Dust Mite (HDM), Pollen, Animal dander and Fungi. The other 50 subjects are without any cardinal symptoms of allergic rhinitis, which form the control group. The study was conducted after taking prior approval from the Institutional ethics committee.

Inclusion Criteria:

- Patients presented to OPD with cardinal symptoms (Sneezing,Rhinorrhea, itching and congestion of nose) of allergic rhinitis with skin prick test positive to any one of the known aero allergen.
- Age group of 18 – 50 years.

Exclusion Criteria:

- Acute infection of the airway.
- Local or systemic usage of corticosteroids, antihistamines or nasal cromoglycate within the previous 4 weeks.
- Patients who are on immunotherapy.

Methodology: A prospective study was done for a period of one year, i.e., from August 2024 to July 2025. Cases were carefully selected after a detailed history, as history plays a major in the diagnosis of allergic rhinitis. Then these cases were subjected to detailed ENT examination. Nasal endoscopy using a 0-degree 4mm endoscopy is done without injuring the structures after external examination of nose and paranasal sinuses and anterior rhinoscopy using thudicum's speculum. Then these patients were subjected to Skin Prick tests for the commercially available aero allergens like House dust mite, pollen, animal dander and fungi and only those patients who turned out to be sensitised for at least one aero allergen (skin prick test positive) are considered for the study [Figure 1]. For the healthy individuals also SPT is done and individuals with negative SPT are included in the study as controls.

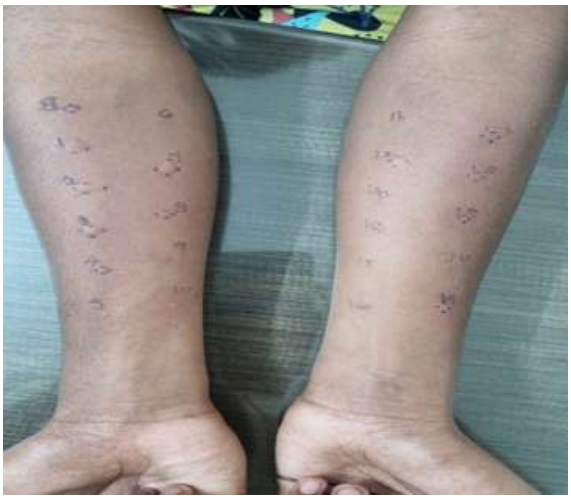

Figure 1: Showing Skin Prick Test

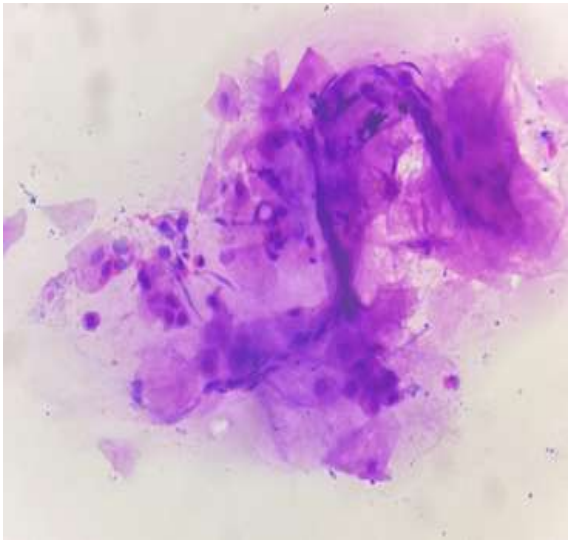

Figure 2: Showing eosinophil infiltrate

Then nasal cytology scrapings were taken from middle part of inferior turbinates of these subjects using a sterile cytobrush and smeared on the glass slides. The slides were fixed using 95% ethyl alcohol for a period of 10 mins. Staining of the glass slide is done with Hematoxylin & Eosin stain. The slide is first stained with Hematoxylin then 1% acid alcohol is added. Then the slide is washed with running tap water and counter stained by Eosin Y. After air drying the smear, it is mounted on Dibutylphthalate Polystrene Xylene (DPX). Then the smear is studied for the different types of cells particularly eosinophils under light microscopy using correct magnification for 10-well spread, high power epithelium fields. The eosinophils percentage per hundred leucocytes are calculated. The number of eosinophils in the smears of patients and healthy individuals are studied and then compared [Figure 2].

RESULTS

The 30 out of 50 patients in the study group are having a positive family history of allergy. In the SPT, about 28 patients are positive for House Dust Mite mix (strongly sensitised). 12 patients are positive for various pollen (grass, weed, tree). 8 patients are positive for animal dander (dog, cat, cockroach) and the remaining 2 patients are positive for fungi [Table 1]. Age group range in the present study was 18 – 50 years and majority of the patients are in the third Decade of life. The mean age in the study group was 28.12 and that of control group was 28.88 [Table 2]. Among 50 patients in the study group, 27 were males (54%) and 23 were females (46%) and with a ratio of 1.17:1. Whereas in control group of 50 subjects, 29 were males (58%) and 21 were females (42%), the ratio is 1.38:1. According to ARIA guidelines patients were categorised into mild - intermittent, mild - persistent, moderately severe – intermittent and moderately severe – persistent [Table 3]. Among the study subjects with allergic rhinitis, in our study the most common symptom was found to be sneezing seen in all the 50 patients (100%) watery discharge from the nose (rhinorrhoea) in 48 individuals (96%), followed by nasal obstruction in 41 individuals (82%) and itching in the nose seen in 34 patients (68%). Out of 50 patients in our study group 39 patients (78%) are having a positive family history and in remaining 11 patients (22%), positive family history could not be elicited. There are many ways to grade the nasal cytology. One such method is semi quantitative method described by meltzer.[5] According to this method the grading is from 0 to 4,0 grade being the absence of eosinophils in the smear, whereas grade 4+ is enormous amount of eosinophils in the smear [Table 4]. Out of 50 patients in many of the patients are in Grade 1 (38%) followed by Grade 2 (28%) and 6 patients are in Grade 0. p value in this study is less than 0.05 which is statistically significant.

Table 1: Type of allergens in allergic rhinitis

Type of allergen	Number of patients
House Dust Mite mix	28(56%)
Pollen	12(24%)
Animal dander	08(16%)
Fungi	02(04%)

Table 2: Age Wise distribution of patients

Age	Number of cases in Study group	Normal of cases in Control group
18 – 30 years	36	32(64%)
31 – 40 years	9	11(22%)
41 – 50 years	5	07(14%)

Table 3: Distribution of patients according to the type of allergic rhinitis

Type of allergic rhinitis	Number of patients
Mild – intermittent	14(28%)
Mild – persistent	10(20%)
Moderately severe – intermittent	12(24%)
Moderately severe – persistent	14(28%)

Table 4: Comparison of eosinophils in nasal scrape cytology

Grading	Control group	Study group
0	43(86%)	06(12%)
1+	05(10%)	19(38%)
2+	02(04%)	14(28%)
3+	00	08(16%)
4+	00	03(06%)

DISCUSSION

Allergic Rhinitis is an age-old disease but the mechanisms that are involved are extensively studied in the past few decades. Allergic rhinitis is gaining importance in the recent times because of its increased prevalence owing to industrialisation, urbanisation and changing practices related to hygiene. It is affecting the quality of life and causing significant impact in day-to-day activities because of its troublesome symptoms, causing socio economic burden.

The mean age in our study was found to be 28.12 with age ranging from 18 to 50 years. In a study conducted by Sood et al,[6] the mean age group is found to be 31.6. whereas in a study conducted by by Varghese et al,[7] it is found to be 29±9.8 years. Weiner et al,[8] reported a mean age of 32 years and Puneet et al,[9] reported mean age of 35.37 years. The observations regarding the mean age in various studies are nearly matching our study and so allergic rhinitis is more come in 3rd and 4th decade of life. In our study, among patients with allergic rhinitis 54% are males and 46% are females. It is in accordance with study conducted by Gaur et al,[10] which shows 55.2% are males. Lasisi et al,[11] also observed male preponderance in their study with 57.1%. Puneet et9 al also reported that 63% were males in their study.

Contrary to our findings Ruttanaphol et al,[12] reported female preponderance of 66.01%. The male dominance in our study may be because of lack of education and inadequate initiative on part of women to attend the hospital, as still in many parts women were not educated enough to understand the importance of their health. In our study 48% reported to have perennial allergic rhinitis and 52% found to be suffering with intermittent allergic rhinitis. According to the studies conducted by Farhoudi et al,[13] Puneet et al,[9] and Varghese et al,[7] the percentage of patients suffering with allergic rhinitis were found to be 29%, 62% and 63% respectively.

In our study we took a detailed history of allergic rhinitis symptoms and it revealed that sneezing is the most common symptom in about 100% of individuals followed by rhinorrhoea (96%), nasal obstruction (82%) and itching in the nose (68%). Ruttanaphol et al,[12] reported that sneezing is most common symptom in about 94.2%of patients in their study. Puneet et al9 found that most common symptom in their study is rhinorrhoea (100%) followed by sneezing (98%). In the observations made by Lasisi et al,[11] and Yadav et al,[14] sneezing and rhinorrhea are found to be the most common symptoms in patients with allergic rhinitis. Our findings are similar with the above-mentioned studies.

We did skin prick test and majority of the patients are found to be sensitised House Dust mite mix (56%). 24% of patients are found to be sensitised to pollen. Animal dander and fungi sensitised patients are 16% and 4% respectively. Our study is conducted in a region which is more humid and dust mite thrive in humid places, this might be reason for more prevalence of dust mite sensitisation in our study. To avoid confusion, we have excluded polysensitised patients and we included only patients with sensitisation to aero allergens.

In our study out of 50 patients in our study group, 19(38%) patients showed grade 1+ nasal cytology. 14(28%) patients showed grade 2+, 08(16%) patients had grade 3+ and 03(6%) patients had grade4+ and 12% of patients are in grade 0. The patients who are having Grade3 and Grade 4 on nasal cytology are having persistent rhinitis. Whereas in the control group we found 43(86%) patients are in grade0. In a study conducted by puneet et al,[9] in the study group 49% and 21% of patients are in grade 1 and 2 whereas is the control group 80% subjects are having grade 0. Lans et al,[15] study reported that 43% of patients with allergic rhinitis have a positive nasal eosinophilia. In a study conducted by Yadav et al,[14] 53.3% of patients suffering with allergic rhinitis found to have positive nasal eosinophilia. Our findings are well in accordance with the findings of above-mentioned studies.

In our study we found that 78% of patients with allergic rhinitis had a strong family history. We all know that allergy runs in families and it has a strong genetic predisposition. Puneet et al,[9] study reported that 83% of patients with allergic rhinitis have definitive family history. Varghese et al,[7] found that in their study 76.92% of allergic rhinitis patients have strong family history. Our findings are in line with Puneet et al and Varghese et al,[7] in relation to positive family history.

CONCLUSION

Allergic rhinitis is a part of atopic march, and it is affecting many people globally. The prevalence is on rise owing to many factors like increased urbanisation, pollution and changed lifestyle. It is affecting the quality of life of the patient and decreasing their performance in work and resulting in economic burden. There are many studies which were showing the positive association of allergic rhinitis with asthma, as both were a part of atopic march. So we need to look for new diagnostic modalities for detecting allergic rhinitis. One among them is nasal cytology which is showing promising results in terms of diagnosing, and it is also a non invasive procedure. We need to carefully thread symptoms, clinical findings and results of the diagnostic tests in the diagnosis of allergic rhinitis.

REFERENCES

1. Vedanthan PK, Nelson HS, Agashe SN, Mahesh PA, Katial R. Textbook of Allergy for the Clinician. 2nd ed. New Delhi: CBS Publishers & Distributors; 2021. Chapter 8.
2. Brożek JL, Bousquet J, Agache I, Agarwal A, Bachert C, Bosnic-Anticevich S, et al. Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines. J Allergy Clin Immunol. 2017 Oct;140(4):950–958.
3. Lieberman P, Pattanaik D. Nonallergic rhinitis. Curr Allergy Asthma Rep. 2014 Jun;14(6):439.
4. Gelardi M, Iannuzzi L, Quaranta N, Landi M, Passalacqua G. NASAL cytology: practical aspects and clinical relevance. Clin Exp Allergy. 2016 Jun;46(6):785-92. doi: 10.1111/cea.12730. PMID: 27009397.
5. Meltzer EO. Evaluating rhinitis: clinical, rhinomanometric and cytology assessments. J Allergy Clin Immunol. 1988;82(5):900–908.
6. Sood A. Diagnostic significance of nasal eosinophilia in allergic rhinitis. Indian J Otolaryngol Head Neck Surg 2005;57(1):13–16.
7. Varghese BT, Murthy PSN, Ranjan R (2000) Clinico-pathological correlation between allergic rhinitis and bronchial asthma.J Laryngol Otol 114:354–358.
8. Weiner JM, Abramson MJ, Puy RM. Intranasal corticosteroids versus oral H1 receptor antagonists in allergic rhinitis: systematic review of randomized controlled trials. BMJ 1998; 317:1624–1629.
9. Puneet Singhvi, Nitish Baisakhiya, Gurchand Singh Study the Role of Nasal Scrap Cytology in Allergic Rhinitis Patients in Rural Population. Indian J Otolaryngol Head Neck Surg 2019; 71(Suppl 3):S2057–S2064.
10. Gaur SN, Gupta K, Rajpal S, Singh AB, Rohatgi A. Prevalence of bronchial asthma and allergic rhinitis among urban and rural adult population of Delhi. Indian J Allergy Asthma Immunol 2006; 20(2):90–97.
11. Lasisi AO, Lawal HO, Ogun GO. Correlation between eosinophilia and nasal features in allergic rhinosinusitis.J Asthma Allergy Educ 2010;1:219–222.
12. Kirtsreesakul V, Ruttanaphol S. The relationship between allergy and rhinosinusitis. Rhinology 2008;46:204–208.
13. Farhoudi A, Razavi A, Chavoshzadeh Z et al. Descriptive study of 226 patients with allergic rhinitis and asthma. Iran J Allergy Asthma Immunol 2005;4(2):99–101.
14. Yadav J, Verma A, Singh J (2003) Study on nasal mucous clearance in patients of perennial allergic rhinitis. Indian J Allergy Asthma Immunol 17(2):89–91.
15. Lans DM, Alfano N, Rocklin R. Nasal eosinophilia in allergic and non-allergic rhinitis usefulness of the nasal smear in the diagnosis of allergic rhinitis. Allergy Proc 1989;10:275–280.