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A comparative study of nasal smear and nasal biopsy in the confirmation of the diagnosis of allergic rhinitis in a tertiary hospital of Rohtas district, Bihar

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ABSTRACT

Background: Allergic rhinitis is an IgE mediated immunological response of nasal mucosa to air born allergens is characterized by watery nasal discharge, nasal obstruction, sneezing and itching in the nose. Objective of this study was to compare and determine the efficacy of nasal smear and nasal biopsy in the diagnosis of allergic rhinitis.
Methods: In this study of total number of patients were 100. These were divided in two group, test and control group and each group contain 50 cases. This study was performed in the period of April 2017 to March 2018 in the department of Otorhinolaryngology, Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar. Nasal Punch biopsy was taken from the inferior turbinate from the selected patient of allergic rhinitis under local anesthetic agent like 2% Xylocaine with adrenaline.
Results: The mean age of the patient undergoing the study was 35.88±13.22 in the study group and 32.96±10.71 in the control group. In this study, sample are matched with p=0.228. Eosinophil in nasal smear is significantly more associated with cases with p<0.001. Mast cells in nasal smear is significantly more associated with cases with P=0.006.
Conclusions: Nasal biopsy is better than nasal smear in diagnosing eosinophils in case of allergic rhinitis but for diagnosing mast cells biopsy is not sensitive enough in compared to nasal smears. So nasal biopsy can be used as a diagnostic test for allergic rhinitis.

Keywords: Allergic rhinitis, Nasal smear, Nasal biopsy, Serum IgE, Eosinophils, Mast cells

INTRODUCTION

Allergic rhinitis comes under hypersensitive disorder of immune system, and IgE-Mediated inflammatory process of the nose, which may be seasonal & is often referred to as "Hay fever of Pollinosis".[1] It is defined as an allergen-induced inflammation of the membranes lining the nose. It is the most common allergic disorder of the respiratory tract. About 20 percent to 25 percent of the population is affected with allergic rhinitis, which makes it by far the most common allergic disease in the world.[2]

Now days, it has become a common disease worldwide; affecting a large segment of the population and its prevalence is increasing. In India 26 percent of the population suffers from allergic rhinitis, which used to be much less 20 year back.[3] According to a recent study in Delhi, the current prevalence of allergic rhinitis, among

the total population covering rural, urban & urban slums of Delhi was 11.69%.[4]

Symptoms of this disease can begin at any age but are most frequently first reported in adolescence or young adulthood.[5] The human body has a particular balance of functions indicated by the emotional status, immunological status and endocrine status. That is, should any of these functions be modified by any cause, such as external/environmental stress, as well as internal stress, the changes are manifested as alterations in this axis, which finally percolate down to the somatic/physical level & manifest disease.[6] Objective of this study was to compare and determine the efficacy of nasal smear and nasal biopsy in the diagnosis of allergic rhinitis.

METHODS

Place of study: The study was carried out in ENT Department of Narayan Medical College & Hospital, Jamuhar, Sasaram Bihar.

Duration of study: Study was conducted over a period of one year from April 2017 to March 2018.

Study material: The subjects were included patients coming in ENT OPD. Study subjects obtained according to the following criteria:

Inclusion criteria

- All patients aged 12 year and above with signs and symptoms of allergic rhinitis.

Exclusion criteria

- Children aged <12 year.
- Patients with non-allergic rhinitis and nasal polyp.
- Patient with sinusitis.
- Patient with bleeding disorder.

Sample size: 100 cases were limited into two groups.

Study design: A prospective study was carried out in 100 cases. Out of 100, test group, was included 50 patients & in control group, was include rest of the 50 Cases. Patients of age group 15 to 75 years were selected for this study from different socio economic status. The sample of secretion and cells were spread over the glass slide and after drying the smear in air, it was fixed by Leishman stain and the slide was examined under the microscope in 125x magnification for eosinophil and mast cells. Nasal Punch biopsy under guidance of 0 and 30 degree rigid nasal endoscope were taken from the inferior turbinate from the selected patient of allergic rhinitis under local anesthetic agent like 2%Xylocaine with adrenaline.

Statistical analysis: The number of eosinophil was recorded using the criteria for the quantification (Ozala and karma, 1982).0 = No cell in any high power field, + = 1 to 3 cells some high power, ++=some cell in most of the high power field and +++ = Many cells in all the field.

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean±SD (Min-Max) and results on categorical measurements are presented in number (%). Significance is accessed at 5% level of significance. Chi-square /Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. Diagnostic statics viz. Sensitivity, Specificity, and Accuracy have been computed. The following statistics defined:

- *Sensitivity:* Probability that a test result will be positive when the disease is present (true positive rate, expressed as a percentage) = a / (a+b).
- *Specificity:* Probability that a test result will be negative when the disease is not present (true negative rate, expressed as a percentage) = d /(c+d).
- *Positive predictive value:* Probability that the disease is present when the test is positive (expressed as a percentage) = a / (a+c)
- *Negative predictive value:* Probability that the disease is not present when the test is negative (expressed as a percentage) = d / (b+d)
- Accuracy is the sum of true positive and true negative divided by number of cases.
- *Diagnostic values based on area under curve:* 0.9-1.0 Excellent test, 0.8-0.9 Good test, 0.7-0.8 Fair test, 0.6-0.7 Poor test, 0.5-0.6 Fail.
- *Significant figures:* Suggestive significance (p value: $0.05<p<0.10$), moderately significant (p value: $0.01<p\leq0.05$), strongly significant ($p\leq0.01$).

Statistical software: The statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, table etc.

RESULTS

The present study was based on observation of total patient 100. In our study the mean age of the patient undergoing the study were 35.88±13.22 in case group

study and 32.96±10.71 in control group study. In this study are matched with p=0.228.

Table 1: Diagnostic statistics.

	Disease		Disease		
Test	**Present**	**n**	**Absent**	**n**	**Total**
Positive	True positive	a	False positive	c	a+c
Negative	False positive	b	True negative	d	b+d
Total		a+b		c+d	

Table 2: Correlation of eosinophils in nasal smear with eosinophils in nasal biopsy.

Eosinophils in nasal smear	Eosinophils in nasal biopsy (n=50)			
	Absent		Present	
	No	%	No	%
Absent	31	62.0	3	6.0
Present	5	10.0	11	22.0
Total	36	72.0	14	28.0

Table 3: Correlation of mast cell in nasal smear with mast cell in nasal biopsy.

Mast cell in nasal smear	Mast cell in nasal biopsy (n=50)			
	Absent		Present	
	No	%	No	%
Absent	36	72.0	6	12.0
Present	7	14.0	1	2.0
Total	43	86.0	7	14.0

In case study group 50% were male and 50% were female. In control group 58% were male and 42% were female. Diagnostics statistics shown in Table 1. Samples are gender matched with p=0.422. In test group incidence of Sneezing is significantly more in cases with p<0.001. Incidence of Rhinorrhea is significantly more in cases with p<0.001. Incidence of Nasal obstruction is significantly more in cases with P=0.011. Incidence of lacrimation is significantly more associated with cases with p<0.001. Mean AEC is significantly more in cases with p≤0.001. Eosinophil in nasal smear is significantly more associated with cases with p<0.001. Mast cells in Nasal smear is significantly more associated with cases with p=0.006. Mast cell in nasal smear is not statistically associated with mast cell nasal Biopsy with p=1.000. Eosinophils in nasal smear are significantly associated with eosinophils in nasal. Biopsy with p<0.000. In our study we found that nasal biopsy is 87.5% than nasal smear for identifying eosinophils for the diagnosis of allergic rhinitis (Table 2). Sensitivity of nasal biopsy in relation to nasal smear for eosinophils was found to be 91.18%. The accuracy of the nasal biopsy for eosinophils was found to be 87.50%. Sensitivity of nasal biopsy in relation to nasal smear for mast cells is 14.29%. Specificity of nasal biopsy in relation to nasal smear for mast cells is 83.72%. The Accuracy of the nasal biopsy for mast cell was found to be 74% (Table 3).

DISCUSSION

Allergic rhinitis is one of the most common disorders of the upper respiratory tract, characterized by sneezing, profuse watery discharge, nose block, increased lacrimation, itching and redness of the eye. 50 patients with symptoms and sign of allergic rhinitis taken as a "test group". And 50 patients without any history of allergic symptoms or nasal symptoms had taken randomly as a control group in this study. Eosinophil in nasal is significantly more associated with cases with p<0.001. Mast cells in Nasal smear in significantly more associated with cases with p=0.006.

Mast cell in nasal smear is not statistically associated with mast cell nasal biopsy with p=1.000. Varney et al conducted a study named immune-histology of the nasal mucosa following allergens-induced rhinitis. Identification of T lymphocytes, eosinophils and neutrophils. This study concluded that the changes in the nasal submucosa were not merely a reflection of alterations in circulating cell populations since it was shown that a significant increase in the lymphocytes CD4/CD8 ratio (p less than 0.05) was observed in nasal biopsies but not in peripheral blood after allergen challenge.[7] The accuracy of the nasal biopsy for mast cell was found to be 74.00%. Rakesh Chandra *et al* conducted comparative study of nasal smear and biopsy in patient of allergic rhinitis. This study concluded that biopsies were found to be better than smears and incidence of eosinophil and mast cell was found to increase with positive history of allergy in family, other of body, inhaled or food allergens and severity of obstruction.[8] Eosinophils in Nasal Smear is significantly associated with Eosinophils in Nasal Biopsy with p<0.000. Sensitivity of nasal biopsy in relation to nasal smear for eosinophils was found to be 78.57%.

Specificity of nasal biopsy in relation to nasal smear for eosinophils was found to be 91.18%. Bakhshaee et al the found that the sensitivity of nasal eosinophil count as a diagnostic test for allergic rhinitis was 51.3% with a specificity of 88.5%, a positive predictive value of 87% and a negative predictive value of 54%. Eosinophilia in nasal biopsies was found in 44% and 30% of allergic patient and controls respectively. There was no significant correlation between symptoms or positive skin test with either smear eosinophilia or tissue eosinophilia. Evaluation of eosinophils in nasal smear is an insensitive but fairly specific test for the diagnosis of allergic rhinitis.[9]

The accuracy of the nasal biopsy for eosinophils was found to be 87.50%. Lanes et al was conducted a study named nasal eosinophilia in allergic and non allergic rhinitis: usefulness of the nasal smear in the diagnosis of allergic rhinitis. This study concluded that these data

suggest that the nasal smear for eosinophils is an insensitive but specific test for the diagnosis of allergic rhinitis. When patient with nasal polyposis sparing sensitivity and/or negative skin test are excluded.[10]

CONCLUSION

Nasal biopsy is better than nasal smear in diagnosing eosinophils in case of allergic rhinitis but for diagnosing mast cells biopsy is not sensitive enough in compared to nasal smears. So nasal biopsy can be used as a diagnostic test for allergic rhinitis.

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