EJMR
ERA'S JOURNAL OF MEDICAL RESEARCH
p-ISSN: 2348-9839, e-ISSN: 2394-5222 | www.ejmr.org

Volum 12 Issue 2
ORIGINAL ARTICLE

Prevalence of Allergic Bronchopulmonary Aspergillosis in Bronchial Asthma

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Received on: 03-05-2025 Published on: 30-08-2025

ABSTRACT

Background: The exact prevalence among patients of bronchial Asthma for Allergic bronchopulmonary Aspergillosis(ABPA) is yet unknown. This study was done to estimate the prevalene of ABPA in patients of Bronchial Asthma

Methods: A total of 140 Bronchial asthma Patients, age ≥12yrs, diagnosed based on symptoms and spirometry were included in the study. All the patients were subsequently subjected to skin prick test for aspergillus fumigatus. Patients with positive skin prick test were subjected to further diagnostic work-up for ABPA. Confirmation of ABPA was done as per Rosenberg-Patterson criteria.

Result: The 140 bronchial asthma patients, Aspergillus Hypersensitivity was seen in 40 (28.6%) cases. IgE/IgG positivity was seen in 16 (11.4%) cases. As per SPT criteria, a total of 40 (28.6%) cases had score 2+ or above and were considered to be positive. Among these, maximum (n=24; 17.1%) had score 2+, 11 (7.9%) had score 3+ and 5 (3.6%) had score 4+. As per Rosenberg criteria a total of 16 (11.4%) cases were identified as ABPA.

Conclusion: There is a high prevalence of ABPA in asthma patients, underscoring the need for screening all asthmatic patients for ABPA.

KEYWORDS: *ABPA, Aspergillus Fumigatus, Bronchial Asthma.*

Era's Journal of Medical Research. 12(2);2025 [doi: 10.24041/ejmr.2025.19]

INTRODUCTION

Asthma is a heterogenous disorder with chronic airway inflammation as a major characteristics. There exists a association between fungal sensitization and asthma severity and a variety of fungi are known to cause sensitization in patients of asthma. One of these known fungi, *Aspergillus fumigatus* has been under immense study, due to its global presence and recognised hypersensitivity with various respiratory disorders.[1,2]ABPA is a disorder of respiratory system mediated by a complex immunological reaction to Aspergillus Fumigatus, usually discovered in patients with bronchial asthma and cystic fibrosis. It is diagnosed by a using a combined approach with clinical history , laboratory findings and radiological findings which includes asthma , serum eosinophila , increased total IgE levels , fleeting opacities on chest x ray , bronchiectasis and Skin prick test with Aspergillus fumigatus antigen .[4,5] ABPA in asthmatics is reported to have enhanced hypersensitivity induced by '*Aspergillus'* species, colonizing the cavities in the lung, as such it has varied presentations ranging from mild form Serologic ABPA (ABPA-S) to fatal destructive severe lung disease (ABPA-CB i.e ABPA with central bronchiectasis, ABPA-ORF i.e ABPA with different radiological findings).[6] The mainstay laboratory diagnosis are serological markers such as specific IgE-Af and IgG-Af (IgE and IgG against 'aspergillus fumigatus'), while the hallmark of radiological diagnosis is fleeting pulmonary shadows and central bronchiectasis.

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How to cite: Rani H, Prasad R, Kacker R, Khan A, Sharma R, Srivastava A. Prevalence of Allergic Bronchopulmonary Aspergillosis in Bronchial Asthma. Era J Med Res. 2025;12(2):10-13.

ABPA is associated with uncontrolled bronchial asthma and often difficult to treat.[7,8,9] Its identification is essential in bronchial asthma patients as it has strong impact on the therapeutic interventions. Its prevalence in patients of bronchial Asthma is unknown. This signifies the lack of well defined criteria and standardized tests for ABPA diagnosis. This study investigates the occurrence of ABPA in patients diagnosed with Bronchial Asthma.

METHODOLOGY

A total 140 Bronchial asthma patients, age ≥12yrs, diagnosed based on symptoms and spirometry were incorporated in this study. These patients were subsequently subjected to skin prick test for aspergillus fumigatus. Patients positive

Table 1: shows the outcome of screening and confirmatory evaluations for ABPA positivity.

SN	Characteristic	Number	%
Major Criteria			
1.	Bronchial asthma	140	100.0
2.	IgE and IgG Positivity		
	Negative	124	88.6
	Positive	16	11.4
3.	Serum Total IgE >1000 IU/mL	34	24.3
4.	Peripheral blood eosinophil count >1000 cells/µl	56	40.0
5.	Central bronchiectasis on HRCT	11	7.9
6.	Chest X-ray opacities	23	16.4
7.	Skin Reaction		
	Negative	100	71.4
	0	98	70.0
	1+	2	1.4
	Positive (2+ or above)	40	28.6
	2+	24	17.1
	3+	11	7.9
	4+	5	3.6
Minor criteria			
1.	Sputum Culture positive	14	10.0
Final Diagnosis			
1.	Aspergillus hypersensitivity	40	28.6
2.	ABPA based on Rosenberg criteria	16	11.4

with SPT were subjected to further diagnostic work-up that included Complete blood check-up, Total serum IgE, specific IgE and IgG for *Aspergillus fumigatus,* Chest X-ray and HRCT-Thorax, Sputum culture, Evaluation of expectoration for brownish-black mucus plug. Confirmation of ABPA was done as per Rosenberg-Patterson criteria.

RESULT

This study was done to estimate ABPA prevalence in patients of bronchial asthma and to correlate it with asthma severity. For this purpose, a total of 140 bronchial asthma patients were enrolled in the study and were evaluated for ABPA positivity.

All the cases had bronchial asthma. Aspergillus Hypersensitivity was seen in 40 (28.6%) cases. IgE/IgG positivity was seen in 16 (11.4%) cases. A total of 34 (24.3%) had serum total IgE >1000 IU/mL. Eosinophil count was seen to be >1000 cells/µl in 56 (40%). Central bronchiectasis on HRCT was seen in 11 (7.9%) cases. A total of 14 (10%) patients had positive sputum culture.

As per SPT criteria, a total of 40 (28.6%) cases had score 2+ or above and were considered to be positive. Among these, maximum (n=24; 17.1%) had score 2+, 11 (7.9%) had score 3+ and 5 (3.6%) had score 4+. As per Rosenberg criteria a total of 16 (11.4%) cases were identified as ABPA.

DISCUSSION

Bronchial asthma could have underlying sensitization to a host of allergens exposure to which might trigger, aggravate and deteriorate the asthma related symptoms. A thorough knowledge regarding the possible allergens and their impact on symptomatic profile and severity of asthma is essential. We assessed the prevalence of ABPA which is a complex clinical entity in the patients of bronchial asthma at our facility situated in North India. Assessment of ABPA can be done through various means, we used Rosenberg-Patternson Criteria[10] for the assesement of ABPA. Of different major and minor criteria described by them, we chose five major criteria to assess the prevalence of ABPA in our patients. Aspergillus hypersensitivity was found out to be 28.6% whereas prevalence of ABPA was 11.4% only. In preceding study, ABPA prevalence has been reported to vary substantially depending upon the various criteria used for the purpose of this assessment. Compared to the present study where 28.6% patients had aspergillus hypersensitivity, Maurya *et al.*[11] could find it in 7.6% patients only. However, Agarwal *et al.*[12] in their study reported the prevalence of allergic hypersensitivity to SPT to be 24.8%. Though the prevalence of ABPA was 12.9% only which is close to that observed in our study. Prasad *et al.*[13] on the other hand considered ABPA diagnosis only when five of the Rosenberg-Patternson major criteria were met and reported the prevalence of ABPA in their study to be only 7.4%. However, as far as aspergillus hypersensitivity is concerned, they also found it to be positive in 30.3% patients which is comparable to 28.6% in the present study. However, compared to the present study where serum IgE/IgG positivity against aspergillus fumigatus was only 11.4% they reported the individual IgE and IgG positivity against aspergillus fumigatus to be 34% and 28.5% respectively. A high prevalence of aspergillus hypersensitivity was also reported by Sabry *et al.*[14] who found it to be positive in 51.9% patients. Some other studies also found aspergillus hypersensitivity between 25 to 35%.[15]

Shahul *et al.*[16] in their study also found the prevalence of ABPA to be 31.3% using Rosenberg-Patterson criteria and reported *Aspergillus* hypersensitivity to be 54%. In another study, Gupta *et al.*[17] also reported IgE/IgG against aspergiilus fumigatus positivity rate to be 28.6% which is much higher than that observed in our study. Lou *et al.*[18] showed that too serum IgE positivity against aspergiilus fumigatus was reported to be 55.4% which is much higher than that in the present study. As such difficulty to assess fungal sensitization is highlighted in different studies and that is why various criteria have been used in different study for such assessment. It is not only the difference in criteria used to detect ABPA but a host of other genetic, environmental and clinical factors determine the level of ABPA burden in different populations. It might highly be dependent on the severity level of asthma.

In one such study among severe asthma patients, Bhankur *et al.*[19] found a higher prevalence of ABPA as high as 70%. The findings of the present study and their comparison with other studies thus show that prevalence of ABPA should be viewed in context with the method for evaluation as well as characteristics of the study population. Among other major and minor criteria in the present study HRCT central bronchiectasis, generalized pulmonary opacities on Chest X-ray and sputum culture positivity were seen in 5.7%, 17.1% and 10% cases respectively. In their study in an exclusive ABPA population, Prasad *et al.*[20] reported abnormal chest X-ray findings in 66.7% of patients. They also reported HRCT central bronchiectasis as the predominant finding in ABPA patients. Both chest X-ray as well as HRCT findings have been reported to be highly sensitive for ABPA detection (100% and 87.5% respectively)[21] however chest X-ray has a very low specificity (50%) as compared to HRCT (100%). In present study, When evaluated for ABPA positivity, the sensitivity and specificity of chest X-ray was 87.9% and 68.7% respectively whereas the same for HRCT was 80.2% and 93.5% respectively.These findings are in agreement with the observations of Mathur and Mathur[21] who also found Chest X-ray to be more sensitive but less specific as compared to HRCT which was more specific but less sensitive.

In the present study, sputum fungal culture positivity was 10%. It incidentally is one of the less reported finding in various studies. Kalaiyarasan *et al.*[22] in their study did not have any case with positive sputum culture. However, Lou *et al.*[18] in their study on 1842 asthma cases had 30 (1.6%) sputum fungal culture positive cases. But Prasad *et al.*[13] in their study showed it to be as high as 29.9% which is probably the highest positivity rate amongst all the studies reviewed by us.

This study signifies a association of aspergillus hypersensitivity and ABPA positivity was observed with sputum culture positivity which should be considered as a temporal relationship. Sputum culture is a less sensitive yet a definitive minor criteria for diagnosis of ABPA. Although, Mortazaee *et al.*[23] in their study reported the sputum culture positivity rate of 81.8%, however, other studies report its positivity to be in 40 to 60% range. However, Kalaiyarasan *et al.*[22] in their study did not find any sample to be culture positive. Lou *et al.*[18] on the other hand found culture positivity in 30/144 of IgE positive patients. In the present study, we found it to be positive in 30% of aspergillus sensitised patients and 68.8% of ABPA positive patients.

CONCLUSION

The results illustrated that a high proportion of patients of bronchial asthma are ABPA positive. Considering this relationship, we recommend screening for ABPA in all the bronchial asthma patients. The findings of the present study need a validation too in a larger sample size. Like antibiotic stewardship the ABPA sensitization may also show a time-dependence and hence frequent assessments for ABPA positivity in bronchial asthma patients should be made at regular intervals.

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