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PERVASIVENESS AND FUNGAL PROFILE OF PULMONARY ASPERGILLOSIS IN IMMUNOCOMPETENT AND IMMUNOCOMPROMISED PATIENTS

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Abstract:

Background: *Aspergillus is a fungus that may exhibit a number of pulmonary symptoms depending on the patient's immune and physiological status. Although the incidence of pulmonary aspergillosis occurs primarily in immunocompromised patients, the incidence is also increasing in immunocompromised individuals, especially in developing countries.*

Aim: *The aim of the study was to determine the occurrence and predisposing factors of pulmonary aspergillosis along with species identification.*

Place and Duration: *In the Tb and Chest Medicine Department of District Headquarter Hospital, Attock for one year duration from March 2019 to March 2020.*

Materials and methods: *The study included one hundred and three patients admitted to the thoracic and tuberculosis department and the medicine department. Patients were personified based on clinical symptoms, physical examination, chest radiography, computed tomography, histopathological examination, bronchoscopy and fungal examination, including potassium hydroxide mount, sputum culture and bronchoalveolar lavage. Species identification was made on the basis of colony features, slide culture and blue mount with lactophenol cotton.*

Results: *Of 103 patients (63 men and 40 women), Aspergillus species were isolated from 17 (16.5%) men and 07 (6.79%) women. Various factors predisposing to pulmonary aspergillosis have been identified, in which pulmonary tuberculosis, chronic smoking and environmental exposure to asbestos were at first places on the list. Many patients had many predisposing factors. Aspergillus species were isolated in 24 (23.3%) cases. Aspergillus fumigatus was the dominant isolated species in 13 (54.16%) cases, followed by Aspergillus flavus in 07 (29.16%), Aspergillus niger in 03 (12.5%) and Aspergillus terrus in 1 (4.16%) case.*

Conclusion: *The incidence of pulmonary Aspergillosis has been found to be quite high in immunocompromised individuals and low in immunocompetent individuals. Appropriate and effective assessment of etiologic factors plays a key role in the management of such patients.*

Keywords: *Aspergillus, Tuberculosis, Sputum, Immunocompromised.*

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INTRODUCTION:

In recent years, yeast infections have been one of the main causes of lung infections. Aspergillus primarily affects the lungs and causes various manifestations such as allergic bronchopulmonary aspergillosis (ABPA), aspergilloma and invasive aspergillosis[1-2]. Invasive pulmonary aspergillosis is a fungal infection with an increasing frequency of high morbidity and mortality in patients with immune deficiency[3-4]. The incidence and clinical effect of these infections are increasing in developed countries in relation to AIDS, malignant tumors and more immune suppressed patients due to more intensive cytotoxic treatment, organ transplantation and better treatment and prophylaxis for other fungal infections. Immunosuppressed people are susceptible to pulmonary aspergillosis, but invasive aspergillosis is extremely rare in people with intact immunity. Immunocompetent people rarely develop this infection and only do so in the presence of other pulmonary and systemic abnormalities such as fibrotic lung disease, suppurative infection or corticosteroid therapy. Pulmonary aspergillosis shows a unique model of lung disease, which primarily depends on the patient's immune status. Preexisting lung diseases serve as an important predisposing cause for pulmonary aspergillosis. Pulmonary aspergillosis usually occurs as a wide range of pulmonary manifestations, from relatively benign aspergillosis to terminally invasive pulmonary aspergillosis[5-6]. Pulmonary aspergillosis is one of the main causes of lung infections and creates a complex diagnostic challenge due to the lack of pathognomonic clinical features[7-8]. The diagnosis of aspergillosis is often skipped, since diagnostic tests for detection are not performed in routine diagnostic laboratories and / or the doctor does not suspect them[9-10]. Therefore, this study aims to determine the prevalence of pulmonary aspergillosis in individuals with immune deficiency and immunodeficiency. b) Examine various predisposing factors. c) Isolation and differentiation of Aspergillus species from clinical samples of patients suffering from lung infections.

METHODS:

This study was performed in 103 patients with different chronic lung infections presenting to the department of chest and Tuberculosis of District Headquarter Hospital, Attock. The cases are the patients with various chronic pulmonary infections of more than one year on whom bronchoscopy, radio imaging was done. This study was approved by the Corporate Ethics Committee. Age, gender, detailed medical history (immunosuppressive conditions such as pulmonary tuberculosis, diabetes mellitus, AIDS etc.), chronic smoking and asbestos, cement, cigarettes, etc. paleness, discotheques, etc.), chest radiography, computed tomography (CT), bronchoscopy, etc. were recorded. A complete blood picture and histopathological examination were performed. We considered infections / diseases as the main risk factor in patients with multiple risk factors. Sputum and bronchoalveolar lavage were homogenized and direct microscopy was performed using 10% KOH support. It was inoculated on one set of Sabouraud's Dextrose Agar (SDA) plain and SDA with Chloramphenicol (0.05 mg/mL) and also on Czapek Dox agar. The inoculated SDAs were incubated at 25 ° C and 37 ° C. The morphology of the anterior and reverse colonies was examined. Lacto Phenol Cotton Blue (LPCB) was prepared to describe the detailed morphology of the isolated template, including hyphae, phialides, vesicles and sporesConfirmation of mushroom species was carried out by slide culture. Statistical analysis: data were analyzed using SPSS 17 version. Descriptive analysis and chi-square test were applied. The results obtained are presented using appropriate tables and graphics.

RESULTS:

A total of 103 patients (63 (61.16%) males and 40 (38.83%) of various age groups showing symptoms of chronic lung infection were admitted to the Hospital services during the study as shown in Table 1 and Table 2.

Table 1: Distribution of culture positive and culture negative patients on the basis of sex.

SEX	Culture Positive Patients	Culture Negative Patients	Total	P value
MALE	17	46	63	χ^2 =1.231 P= 0.2671
FEMALE	07	33	40	
TOTAL	24	79	103	

Table 2: **Age group of culture positive and culture negative patients.**

Age Group	Culture Positive	Culture Negative	Total	P value
0-20 YRS	01	23	24	χ^2 =6.92 P= 0.0314*
21-40 YRS	08	24	32	
>40 YRS	15	32	47	
TOTAL	24	79	103	*Significant

The chi square test is appropriate at 5% level which shows no significance among culture positive males and females while significant in age group > 40 years (Elderly). Aspergillus species were isolated from 17 (16.5%) males and 07 (6.79%) females. There are 17 culture positive cases among immunocompromised and 07 cases among immunocompetent cases. Based on the data of the clinical history including pulmonary aspergillosis, based on clinical history data, pulmonary tuberculosis, diabetes mellitus, HIV infection, chronic smoking, recurrent respiratory infections, and bronchial asthma are documented in Figure 1).

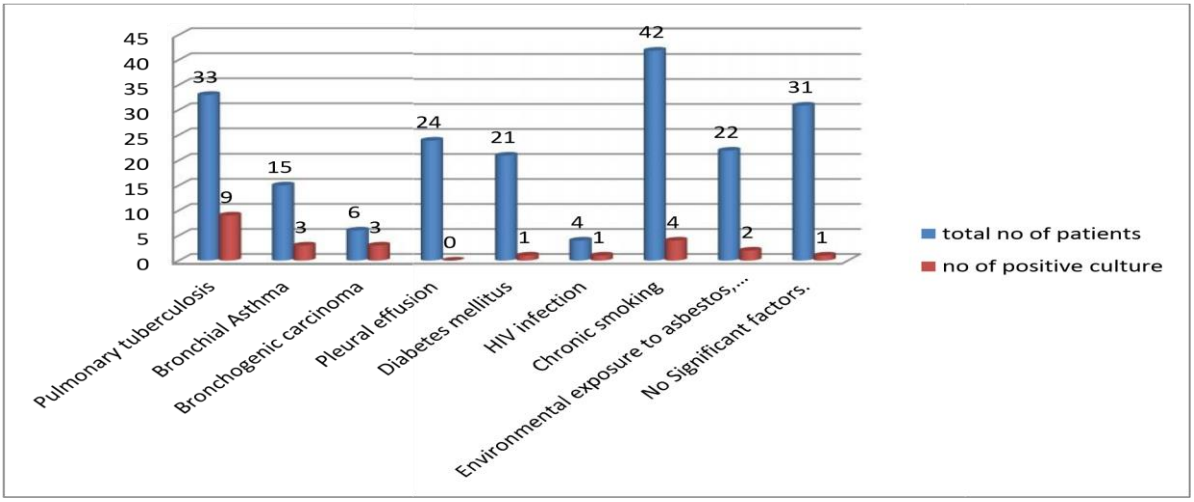

Table 3: The incidence of *Aspergillus* species isolated among patients of chronic lung disease.

SPECIES	No. of Positive Cultures	Percentage	**P value**
Aspergillus fumigatus	13	54.17%	χ^2 = 6.92 P= 0.0314*
Aspergillus flavus	07	29.17%	
Aspergillus niger	03	12.5%	
Aspergillus terrus	01	4.7 %	*Significant

Aspergillus fumigatus is the dominant strain isolated from 13 (54.17%) significant cases using the chi-square test, followed by Aspergillus flavus isolated in 7 (29.17%) cases and 3 (12.5%) cases. Aspergillus Niger and 1 (4.7%) Aspergillus terrus case as shown in Table 3 and Figure 2.

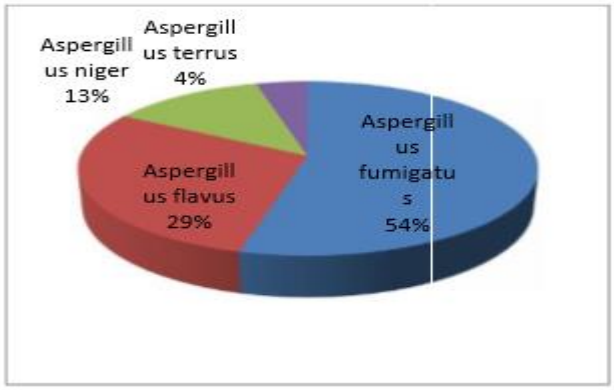

Fig 2: Percentage of *Aspergillus* species in culture positive patients.

DISCUSSION:

Aspergillus species are common saprobic in the soil and vegetative spores are always present. In general, only immunocompromised patients or people with other chronic lung conditions are sensitive. Recently, invasive pulmonary aspergillosis reports have increased in immunocompetent patients[9-10]. Immunocompetent patients are usually asymptomatic and aspergillosis is found only by chance. However, rare cases of pulmonary aspergillosis have been documented in patients with a robust immune system. Recently, invasive pulmonary aspergillosis reports have been reported in patients with COPD and apparently immune deficiency[11-12]. In our study, the prevalence of pulmonary aspergillosis was 23.3%. Henderson et al., Pepy et al. 8%, and Campbell and Clayton 8.2%, with a prevalence of 11% incidence. This may be due to the greater exposure of patients to environmental factors and environmental conditions that support the growth of the fungus[13-14]. Risk factors included pulmonary tuberculosis, chronic smoking, bronchial asthma, bronchogenic carcinoma. Multiple risk factors were also found in hospitalized patients. Previous studies have identified risk factors such as COPD, systemic corticosteroid therapy, non-hematological malignancy, chronic kidney disease, liver failure, diabetes mellitus, close to suffocation, HIV infection, etc. The incidence of aspergillosis was more common in men than women, more in adults than in children, which may be due to greater exposure to risk factors. Our study showed higher incidence of aspergillosis in individuals with immune deficiency and lower incidence in individuals with immune deficiency. Rapid diagnosis methods of pulmonary aspergillosis are based on isolation of Aspergillus in culture, serological methods and histopathological examination, which is an invasive method, so that both doctors and patients may be reluctant to do so[15-16]. The culture was positive in 24 (23.3%) samples. Aspergillus fumigatus, Bordane et al. And it is the dominant species isolated in 13 (54.17%) cases consistent with the findings of Shahid et al. Other isolated species were Aspergillus flavus, Aspergillus niger and Aspergillus terrus (29.17%) in 7. 3 (12.5%) and 1 (4.7%) cases.

CONCLUSION:

Finding of Aspergillus species in respiratory tract samples in the patients should not be routinely discarded as colonization, even if the patients are immunocompeten. From this study, the prevalence of pulmonary aspergillosis increased in patients with immunocompromised and immunocompetent condition; therefore, any patient with chronic lung infection that does not respond to regular antibiotic therapy should be screened for Aspergillus infection. Positive sputum culture, any signs of aspergillosis by serological tests should force the doctor to begin antifungal therapy.

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