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**PROFILE OF PARANASAL SINUS FUNGAL INFECTIONS WITH
 SPECIAL REFERENCE TO *ASPERGILLUS* SPECIES**

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Abstract

Purpose: To study the prevalence and predisposing factors of *Aspergillus* infection and correlate microscopic, cultural findings and drug sensitivity.

Methods: Nasal discharge samples from 156 cases of nasal polyp, chronic sinusitis, rhinosinusitis and chronic rhinitis with clinical suspicion of having fungal infections were examined microscopically and culture was done. Minimum inhibitory concentration (MIC) of Itraconazole, Amphotericin and Fluconazole were tested against the *Aspergillus* species isolates.

Result: *Aspergillus* species were isolated in 29/156 (18.58%) cases and *Aspergillus flavus* was the predominant species isolated in 20/156 (12.82%) cases. This fungus was found to be sensitive to itraconazole with MIC 0.125 -1 µg/ml.

Conclusion: *Aspergillus flavus* was more common in paranasal sinus infections and it was more effective to itraconazole. Prolonged steroid therapy and prolonged antibiotic therapy were the major risk factors.

Keywords: Aspergillosis, Prevalence, Risk factors, Drug sensitivity.

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Introduction

Fungal disease of the nose and paranasal sinuses is relatively rare. Aspergillosis is becoming an increasingly recognized most common fungal pathogen in the sinonasal tract.¹ The largest number of cases of *Aspergillus* sinusitis occurs in hot, dry, dusty climates of Sudan, Saudi Arabia, North India and South western USA as endemic zones.² This type of climatic condition produces chronic

inflammation, allowing an in growth and tissue damage by the fungus and its metabolites.³ The nose and paranasal sinuses may have local factors that may promote fungal infection, including nasal polyps, recurrent bacterial infections and chronic rhinitis with stagnation of nasal secretions.⁴ Aspergillosis of the sinuses comprises a spectrum of diseases ranging from a benign form to an

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aggressively invasive type.⁵ Mycotic paranasal sinus infections commonly occur in elderly persons, cultivators, diabetic cases, prolonged steroid & antibiotic therapy and immunosuppression.⁶

Recently it has been conclusively proved that *Aspergillus* infection of the paranasal sinuses is on the rise, especially in immunosuppressed patients.^{6,7} The present study was undertaken to find the prevalence of mycotic paranasal sinus infections and the profile of the fungi responsible in Nagpur, India. Special attention was given to assess the prevalence of various species of *Aspergillus*, predisposing factors and drug sensitivity.

Materials and Methods

Subjects

The Study was carried out at the Department of Microbiology, Government Medical College and Hospital, Nagpur, India. Nasal discharge (material) samples from 156 cases of chronic sinusitis (66 cases), nasal polyp (35 cases), rhinosinusitis (30 cases) and chronic rhinitis (25 cases) with clinical suspicion of having fungal infections were included in this study.

Microbiological tests

A sterile swab was used to collect the nasal discharge coming out of nasal conchae and/or sinus washings using sterile normal saline with the help of the clinician.

The samples were examined for fungi by microscopic examination of 10% KOH mount. The culture was done on Sabouraud's dextrose agar with chloramphenicol and species were identified as per the standard methods. Slide culture was carried out to identify the isolate up to the species level.^{8,9}

For *Aspergillus* species the susceptibility to Amphotericin B, Itraconazole and Fluconazole was tested by determining minimum inhibitory concentration (MIC) by agar dilution method at Ranbaxy Research Laboratory, Gurgaon, Haryana. Statistical Package for the Social Sciences (SPSS) version 21 was used for descriptive statistical analysis.

Results and Discussion

In the present study; out of 156 cases of paranasal sinus infections, (96) cases were males and (60) cases were females. The male-female ratio was

(1.6:1). Maximum numbers of paranasal sinus diseases 31.87 % were in the age group 31 to 40 years followed by 24.86% in 21-30 years and in more equal to 60 years 21.65%. The age group ranged from 3 to 93 years. Out of the 156 paranasal sinus infection cases, *Aspergillus* was isolated in 29 (18.58%) cases.

Aspergillus flavus was the predominant species isolated in 20 (12.82%) cases followed by *Aspergillus fumigates* 6 (3.84 %) and *Aspergillus niger* 3 (1.92%). Among *Aspergillus* isolated cases, *A. flavus* was present in 68.97 % (20/29) cases, followed by *A. fumigates* 0.69 % 6/29 and *A. niger* 10.34 % 2/29 cases.

Association between various predisposing factors leading to *Aspergillus* infections in paranasal sinus cases was seen. Prolonged antibiotic drug treatment was found to be most common associated factor 20/29 followed by use of prolonged steroid drug treatment, 14/29, neutropenia 8/29 and malignancy 6/29 cases. The Odd's ratio was significant in cases on prolonged steroid drug treatment (OR: 12.0, significant) and in cases on prolonged antibiotic treatment (OR: 7.3, significant). The significance was also confirmed on chi-square statistics. All strains of *Aspergillus* isolated in the study were also tested for antifungal susceptibility to three drugs, Amphotericin B, Itraconazole and Fluconazole.

Of the total 156 cases of paranasal sinus infections studied in the present study, 29 (18.58%) revealed the fungal etiology. The frequency of mycotic paranasal sinus infections varies from place to place [10]. On culture *Aspergillus* species was isolated in the present study all well-known to cause paranasal sinus infections. *A. flavus* was the predominant species isolated followed by *A. fumigates* and *A. niger*. Among *Aspergillus* isolated cases, *A. flavus* was present in 12.82% (20/29) cases. Similar types of observations have been reported by other studies.^{11, 12}

For the diagnosis of fungal etiology, culture of fungus is more useful than microscopy as its positivity is more as compared to direct microscopy. Besides, it is useful for identification of species of fungus which is not possible with microscopy alone. In the present study, the most common cause of paranasal sinus infections was due to prolonged antibiotic therapy and 20 out of 29 isolates were obtained from these patients. Other predisposing factors associated were neutropenia and malignancy. Similar type of

observations have been reported by other studies too.¹³⁻¹⁵

Aspergillus species was the only isolated fungal agent and its anti-mycotic susceptibility indicated that amphotericin B and itraconazole were useful drugs while MIC for Fluconazole was high. Hence, for empirical therapy fluconazole may not be the first choice.

Thus the results of this study indicate that the paranasal sinus infections due to *Aspergillus* species can occur in 18.58% cases. In the region the etiology is not very diverse; *Aspergillus* species are more prevalent, similar reports have been published by other authors.¹⁶⁻¹⁹ Microscopy is useful for diagnosis but along with it culture is essential to increase the sensitivity of diagnosis and identification of the fungal species.^{20,21} Routine testing of all cases of paranasal sinus diseases with risk factors like prolonged antibiotic or steroid therapy should be screened for the fungal etiology since the management of this problem differs from other infections.

Conclusion

Aspergillus flavus was more common in paranasal sinus infections and it was more effective to itraconazole. Prolonged steroid therapy and prolonged antibiotic therapy were the major risk factors.

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