

Mycological Profile of Fungal Rhinosinusitis in a Tertiary Care Hospital

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ABSTRACT

Introduction: Fungi are the common cause of rhinosinusitis. The aim of the research was to isolate and identify fungi causing rhinosinusitis.

Material and Methods: The present study was conducted over a period of 18 months (December 2013 to June 2015) and comprised patients of all age groups and either sex presenting with features of fungal rhinosinusitis. Specimens collected were Nasal mucosa and crusts/ nasal scrapings, maxillary antral aspiration using sterile techniques, endoscopic guided middle meatus swab/aspiration, sinus tissue culture during endoscopic sinus surgery, nasal discharge and excised nasal polyp.

Results: a total of 216 cases of fungal rhinosinusitis were analysed out of which fungal positivity was 46(21.29%) by direct examination/ culture or both. The most common fungus isolate was *Aspergillus flavus* 23(50%) followed by *Aspergillus fumigatus* 7(15.22%).

Conclusion: As fungal diseases are not notifiable infections like viral, bacterial or parasitic disease hence these are not given much attention and usually diagnosis is established very late. Therefore early diagnosis and recognition of fungal sinusitis is very important, not only because it is curable in the early stages, but also to prevent progression of the disease in to the more serious and destructive invasive forms.

Keywords: Fungal rhinosinusitis, *Aspergillus flavus*

INTRODUCTION

Rhinosinusitis is group of disorders characterised by inflammation of the nose and the paranasal sinuses. Fungi are not an uncommon cause of sinusitis and incidence of such infection in recent years has shown marked increase in healthy population especially in North India. An estimated 5-10% of chronic sinusitis patients actually have a form of fungal sinusitis. The infection is substantiated by demonstration of fungal elements in debris material aspirated from affected sinuses as well as in culture. *Aspergillus flavus* is the predominant agent isolated from cases of allergic fungal rhinosinusitis in the Indian subcontinent, whereas in the other parts it is *Aspergillus fumigatus*.¹ Fungal rhinosinusitis (FRS) is categorized into two groups: (A) Invasive and (B) Non-invasive fungal rhinosinusitis. Invasive diseases include: 1) acute invasive (fulminant) FRS; 2) granulomatous invasive FRS and; 3) chronic invasive FRS. The non-invasive diseases include: 1) saprophytic fungal infestation 2) fungal ball and 3) fungus related eosinophilic FRS that includes allergic fungal rhinosinusitis (AFRS).²

MATERIAL AND METHODS

The present study was conducted over a period of 18 months (December 2013 to June 2015) and comprised patients of all

age groups and either sex presenting with features of fungal rhinosinusitis and 216 samples were collected from outpatient department of Ram Lal Eye and ENT Hospital attached to Government Medical College Amritsar. The Patients were recruited in the study after an informed consent based on following inclusion and exclusion criteria and approval of ethical committee was taken.

Data collection

The following data was collected:-

- Patients details including name, age, sex, CR no, history (present, past, personal, family, treatment)
- Presenting features like nasal discharge, nasal polyposis, proptosis, headache, cheek swelling, diminished vision, blindness, seizures, vomiting and altered sensorium.
- Investigation details.

Sample collection and transport

The indications for obtaining specimens for culture are according to the standard recommendations and guidelines. Antibiotics were withheld one week prior to the operations. The specimens collected were Nasal mucosa and crusts/ nasal scrapings, maxillary antral aspiration using sterile techniques, endoscopic guided middle meatus swab/aspiration, sinus tissue culture during endoscopic sinus surgery, nasal discharge and excised nasal polyp.

Processing of fungal specimen:

Microscopy³: The direct microscopic examination of the samples was done by potassium hydroxide (KOH) preparation. A drop of 10% KOH was poured on specimen and coverslip was placed over it. The slide was heated gently over flame and examined under microscope after few minutes. If specimen was not properly dissolved, it was kept for some more time in a wet petridish and examined. Overheating was avoided so that crystals of KOH were not formed.

Culture⁴: The samples were inoculated on two tubes of Modified Sabouraud dextrose agar (SDA) with antibiotics (chloramphenicol 50mg and gentamicin 20mg). One tube was kept at 25°C and second tube was kept at 37°C. The

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inoculated media was kept for a minimum period of three weeks. The growth obtained was identified on the basis of colony morphology, pigment production and microscopic examination by LCB preparation.

Lactophenol Cotton Blue (LCB)^{5,6}: Mount was made from growth on culture media to study morphological features of fungal isolates.

RESULT

Out of 46(21.29%) fungal positive specimens, 26(56.52%) were positive by both culture and direct KOH examination and 14(30.43%) were KOH positive and culture negative. Cultures the most common fungus isolated was *Aspergillus flavus* 23(50%) followed by *Aspergillus fumigatus* 7(15.22%) and *Mucor spp* 5(10.86%). Other fungal isolates were *Aspergillus terreus* 4(8.69%), *Penicillium spp* 3(6.52%) and *Fusarium* 2(4.35%). Among the less commonly isolated fungi were *Rhizopus spp* 1(2.18%) and *Alternaria spp* 1(2.18%).

DISCUSSION

In our study there was predominance of chronic sinusitis in male patients with male: female ratio of 1.4:1 which is concordant with the study done by Prateek et al⁷ (1.33:1) and Shone GR (1.8:1).⁸ However study done by Micheal et al⁹ and Dufour et al¹⁰ showed female predominance. The results obtained in this study can be attributed to the fact that the males are more commonly exposed to irritating pollutants to traffic, dust and factories.

In this study, 155(71.76%) patients were from middle class and 61(28.24%) were from poor class. There were no patients from rich class. Most of the patients belong to urban area 130 (60.19%) than rural area 86(39.81%). This can be due to the fact that the population residing in urban area is more commonly exposed to the irritant pollutants of traffic, dust, factories residuals as compared to the rural region,

these irritants leads to rhinitis which further leads to chronic sinusitis.

In our study age of patients ranged from 11 to 60 years (mean 27.6 years). Maximum numbers of cases were found to be of age group 21 – 40 (69.44%). The least age group was 51-60 years (3.70%). There were no cases from age group below 10 and above 60 years. This is similar to the study done by Das et al¹¹ in Chandigarh reported ages of patients with fungal rhinosinusitis ranged from 2 to 81 years (mean 31 years).

In the present study out of 216 cases, the most common presenting complaints were nasal obstruction 196(90.74%) followed by posterior nasal discharge 160(74.07%), anterior nasal discharge 126(58.33%), headache 98(45.37%), aural symptoms 38(17.59%), cough with expectoration 38(17.59%), fever 32(14.81%), ocular symptoms e.g. watering of eyes, diminished vision, blindness 22(10.18%) and facial fullness 16(7.41%) In another similar study done at PGI Chandigarh rhinorrhoea with nasal polyposis (45.8%) and proptosis (46.4%) were the most common presentations followed by headache (11.3%), cheek swelling (9.5%), Diminished vision (8.9%), blindness (5.3%) and seizures, vomiting and altered sensorium (5.3%).¹²

The most common risk factor found in our study was Nasal allergy 42(19.44%) followed by deviated nasal septum 24(11.11%) and nasal polyp 24(11.11%). Other risk factors were hypertension 12(5.55%), bronchial asthma 10(4.62%) and Diabetes 9(4.16%) In India bronchial asthma and diabetes mellitus are extremely common and in some patients these conditions remains undiagnosed which predispose them to chronic sinusitis.

In this study fungal positivity was 46(21.29%) by direct examination/ culture or both. Out of these 26(56.52%) were positive by both culture and direct KOH examination and 14(30.43%) were KOH positive and culture negative. This could be due to antifungal therapy or due to inadequate specimen as well the faulty technique of SDA slant inoculation. The correlation is statistically significant. The most common fungus isolate was *Aspergillus flavus* 23(50%) followed by *Aspergillus fumigatus* 7(15.22%). This is due to the fact that dust and frequent sand storms contain large number of *Aspergillus* conidia that can easily settle on the injured mucosa of the sinuses. Other fungus isolates were *Mucor spp* 5(10.86%), *Aspergillus terreus* 4(8.69%), *Penicillium spp* 3(6.52%) and *Fusarium* 2(4.35%). Among the less commonly isolated fungi were *Rhizopus spp* 1(2.18%) and *Alternaria spp* 1(2.18%). This study was similar to the study done by Michael et al in Tamil Nadu where *Aspergillus flavus* (47.61%) was the most common isolate followed by *Aspergillus fumigatus* (14.28%).¹³ In another study done by Veress et al who reported 46 cases in Sudan caused by *Aspergillus flavus*.¹⁴ He also reported that hot climate with low humidity is responsible for this disease. Similar weather conditions are also found in Punjab.

Despite recognition of fungal rhinosinusitis as a serious disease entity for more than two centuries, our knowledge about the epidemiology and medical microbiology of the disease remains incomplete and subject to newer findings and research.

Direct examination (KOH)	Culture positive (N=32)	Culture negative cases (n=184)
KOH positive (n=40)	26(56.52%)	14(30.43%)
KOH negative (n=176)	6(13.04%)	170(78.70%)
X ² = 85.630, DF = 1, P value < 0.001 which is highly significant		
Table-1: Distribution of fungus isolates on the basis of direct and culture examination		

Type of fungus	No of cases	Percentage (n=46)
<i>Aspergillus flavus</i>	23	50.00
<i>Aspergillus fumigatus</i>	7	15.22
<i>Mucor spp.</i>	5	10.86
<i>Aspergillus terreus</i>	4	8.69
<i>Penicillium spp.</i>	3	6.52
<i>Fusarium</i>	2	4.35
<i>Rhizopus spp.</i>	1	2.18
<i>Alternaria spp.</i>	1	2.18
Total	46	100.00
Table-2: Distribution of fungal isolates in clinical cases of rhinosinusitis		

CONCLUSION

These days since the awareness among people is increasing and they are becoming more concerned about the health related issues so there is better recognition of this disease entity. The mycological assessment are essential to confirm the diagnosis. These mycological protocols if carried out in well-equipped microbiology laboratories having all advanced facilities available for isolation and identification of the causative agents, the diagnosis can be simplified since there are no specific clinical and radiological indicators. Therefore our suggestion to clinicians is that all the rhinosinusitis patients should be screened for fungal etiology. Treatment requires surgical debridement to remove the hypertrophic tissue and mucinous secretions, nasal and oral corticosteroids are often used to modulate the immune response.

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