

Mycological Profile of Respiratory Tract Samples in a Tertiary Care Hospital from Western India

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ABSTRACT

There has been a rise in opportunistic fungal infections in the recent years. Respiratory fungal infections are an important cause for mortality and morbidity in such cases. This study was planned to study the mycological profile of respiratory samples in a tertiary care hospital. This was a retrospective study conducted over a period of 2 years in the department of Microbiology in BJGMC and Sassoon hospital, Pune. The samples were first observed under KOH mount and inoculated on SDA. The growth was identified using standard microbiological methods. A total of 70 respiratory samples were evaluated in the study out of which 40 were culture positive. *Candida albicans* was identified as the predominant species followed by *Aspergillus spp*, *non albicans Candida* and *Geotrichum spp*. Early diagnosis and proper understanding of the causative agent plays an important role to improve the outcome of the patients.

Keywords- Respiratory, Candida, Aspergillus

INTRODUCTION

Recent years have seen an increase in opportunistic fungal infections in immuno-compromised patients.^[1] Respiratory fungal infections are important cause for mortality and morbidity in these patients.^[2] The species isolated, their incidence, clinical pattern, and antifungal susceptibility has also altered significantly.^[3] Hence, early diagnosis, proper understanding about agents and host factors involved will help the clinician to improve the outcome of these patients. Thus, this study was planned to study the mycological profile of respiratory samples in a tertiary care hospital and to identify the predisposing factors and host factors associated with it.

MATERIALS AND METHOD

This was a retrospective laboratory-based study conducted over a period of 2 years (January 2019 to December 2020), in the department of Microbiology in BJGMC and Sassoon hospital, Pune. All the respiratory samples like sputum, bronchial alveolar lavage (BAL), endo tracheal secretions and pleural fluid which were received in mycology laboratory were included in this study. BAL, pleural fluid, endotracheal secretions were concentrated by centrifugation at 1500-2000g for 5 minutes. Samples which contained clot and membranous materials. Sputum samples were treated with N Acetyl Cysteine prior to inoculation on Sabouraud Dextrose Agar (SDA).

All samples were first observed under KOH mount (20%) and then

inoculated on 2 sets of (SDA) with and without cycloheximide was observed on at 25°C and 37°C alternate day for first week and after weekly for 4 weeks.

Growth was isolated and identified by using standard microbiological methods. Yeast identification included grams staining, germ tube test, CHROM agar identification and cornmeal agar (CMA) identification techniques. Moulds were identified using colony morphology, microscopy Lactophenol Cotton Blue (LPCB) and slide culture techniques.

Statistical Analysis- All statistical analysis was done using MS Excel.

RESULTS

A total of 70 respiratory samples were evaluated under this study. Out of 70 respiratory samples, sputum 30 (42.8%) was most common followed by BAL 26 (37.14%), Endo tracheal secretions 12 (17.1%) and pleural fluid 2 (2.86%).(Fig1)

Out of 70, 40 (57.1%) were culture positive. The most common age group affected was 30 to 50 years. Males were more commonly affected with ratio 1.6:1. Predisposing factors included tuberculosis (15 cases; 37.5%), chronic obstructive pulmonary disease (12 case; 30%), pneumonia-like lesions and lung infiltrations (10 cases; 25%), and bronchiectasis (5 cases; 12.5%).(Fig2). Majority of patients had outdoor occupation (farmers, laborers etc.)

Isolation rates from sputum were highest (26 samples; 65%), followed by BAL (9 samples; 22.5%), endo-tracheal secretions (4 samples; 10%) and pleural fluid (2 samples; 5%). A total of 32 samples were both KOH and culture positive but six sputum samples and two BAL samples were positive only by culture method.

In sputum samples, *Candida albicans* (15 isolates; 57.69%) was most isolated followed by *Aspergillus spp* (eight isolates; 30.77%), non-albicans candida (three isolates; 11.54%), and *Geotrichum*

spp (one isolate; 3.85%). In BAL, *Candida albicans* (four isolates; 44.44%), *Aspergillus spp* (two isolates; 22.22%), *Rhizopus* (one isolate; 11.11%) and non-albicans candida (one isolate; 11.11%) were isolated. Endo-tracheal secretions was positive for *Candida albicans* (two isolates; 50%) and non-albicans candida (two isolates; 50%).

Over-all in respiratory samples, *Candida albicans* (22 isolates; 55%) was identified as the predominant species followed by *Aspergillus spp* (eight isolates; 20 %; six isolates of *A. fumigatus* and two isolates of *A. flavus*). Other isolates were non-albicans *Candida* (six isolates; 15%), followed by *Rhizopus spp* (one isolate; 2.5%) and *Geotrichum spp* (one isolate; 2.5%).

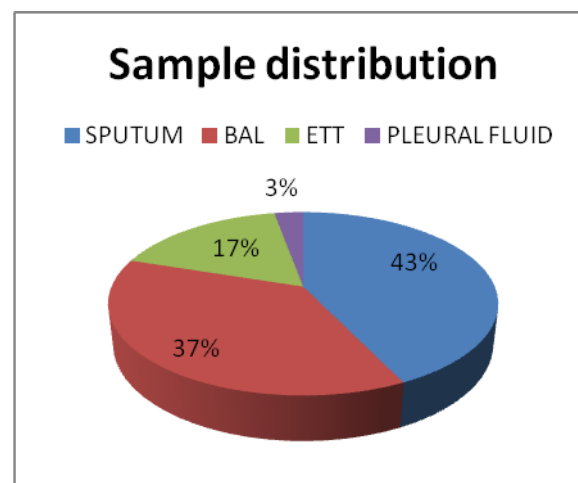


Fig:1: Sample Distribution

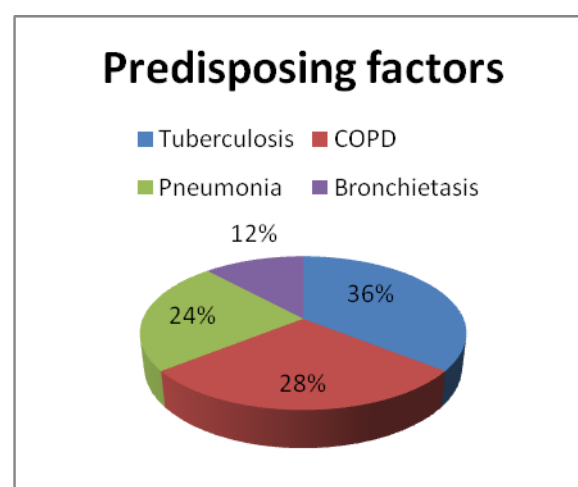


Fig:2: Predisposing Factors

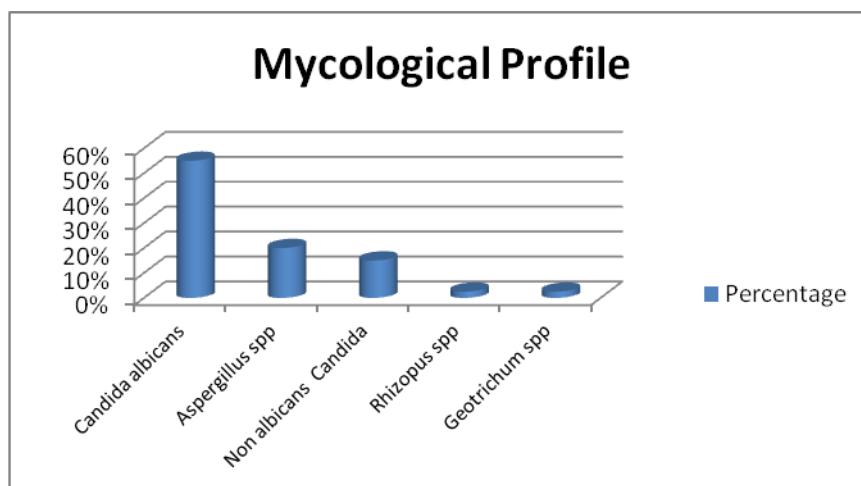


Fig :3: Mycological Profile



Fig 4 : KOH –Fungi filaments



Fig 5: *Candida spp* on SDA



Fig 6: *Rhizopus* on SDA

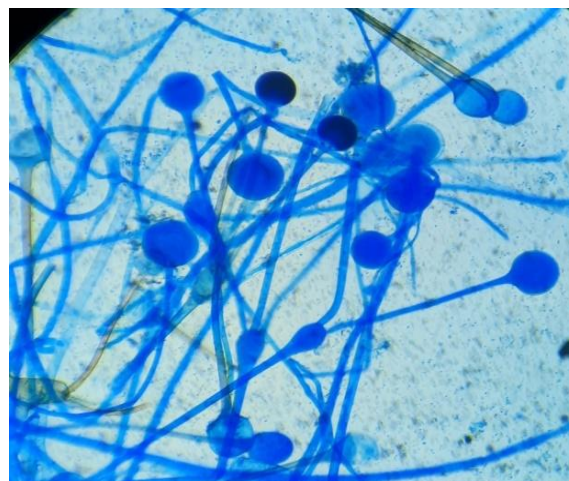


Fig 7 : LPCB *Rh*

DISCUSSION

Respiratory tract infections are important causes for mortality and morbidity in immune-compromised patients. Opportunistic fungal infections are common cause for fungal pneumoniae in developing

countries like India.^[4] Hence, identification of etiological fungal pathogens it is especially important for early management and treatment of patients.

In this study, 57.1% of respiratory samples were positive on fungal culture and

sputum samples (65%) showed the highest positivity among all samples. This was similar to the study conducted by Roohani et al.^[5] where sputum samples showed 58% positivity. It is important to note that this increase can also be due to commensal yeast and environmental inhalation of spores, which gives false positive results in sputum samples.^[6]

In the present study, males were more affected which is like many other studies related to respiratory tract infections.^[6,7,8] Tuberculosis is a major risk factor according to our study, which is in concordance with a study conducted by Amiri et al., in 2017.^[9]

KOH preparation serves as a good screening test for determining the presence of fungal infections.^[10] Direct KOH examination helps the clinician to start early treatment and management. In present study, 80% of positive samples showed fungal filaments under KOH mount which helped to improve the outcome of patients due to earlier institution of appropriate treatment.

Candida albicans (55%) was the most predominant species isolated from all respiratory samples similar to study by Kandati et al.^[11] candida species were most commonly isolated fungal pathogens. This is in contrast with a study conducted in northern India by Sharooq et al.⁶ where they identified *Aspergillus species* as major pathogen in respiratory samples.

Aspergillus species primarily affects the lungs causing upper and lower airway disorders.^[12, 13] Its spores are ubiquitous and present almost everywhere in the human environment, outdoor and indoor.^[14] Among *Aspergillus species*, *A. fumigatus* was most commonly isolated followed by *A. flavus* in our study, this finding is similar to Farooq S et al related to mycological profile of LRTI.^[6]

Literature search suggests that there are only a very few studies related to mycological aspects of Respiratory samples. Fungal respiratory infections are increasing daily, hence more researches related to this

has to be done for developing faster diagnostic techniques for better management of patients.

CONCLUSION

Respiratory fungal infections remain a significant cause for morbidity and mortality in the World. This study provides a basis for early detection of fungal etiology in respiratory tract infections. Early diagnosis, proper understanding of agent and host factors involved, plays an important role to improve the outcome of these patients.

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