



Emerging Fungal Respiratory Tract Infections in a Tertiary Care Hospital of North India, Punjab

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Introduction

Among all the infectious diseases, Respiratory tract infections are globally responsible for one-third of disease associated mortality, accounting for 4.3 million annual deaths. Among these, fungal infections of the respiratory tract are largely unrecognized, and the true burden is elusive.^[1] Despite treatment, most invasive chronic respiratory fungal infections are associated with high mortality rates of >50%.^[2] Fungi may colonize body sites without producing disease or they may be a true pathogen, generating a broad variety of clinical syndromes.^[3] Early diagnosis and appropriate timely treatment are essential to prevent the emergence and further spread of such chronic respiratory tract infections.^[4] The present study was undertaken to determine the prevalence of common fungal pulmonary infections at a tertiary care hospital of Punjab.

Material & Methods

This study was conducted in Department of Microbiology, Government Medical College, Amritsar for a period of one year from May 2018

to June 2019. Sputum samples received from adult patients above 18 years presenting with clinical symptoms of fungal respiratory tract infections were included in this study. Sputum samples were collected in a sterile wide mouthed container. Before collecting sputum sample, patients were advised to wash their mouth with distilled water to avoid contamination with commensal flora from oral cavity.⁽⁵⁾

Samples were analyzed by direct microscopy (KOH and Gram stain) followed by culture on Sabouraud's Dextrose Agar. Direct microscopic examination to visualize the presence of fungal elements or any budding yeast cells was done by using 10% KOH for all the samples. To identify gram positive yeast cells, Gram staining was done. All the samples were cultured by inoculating in duplicate on Sabouraud's dextrose agar (SDA) with antibiotics (Chloramphenicol and Cycloheximide) and without antibiotics. Culture tubes were incubated at 25°C and 37°C and examined for six weeks for the growth of any fungus. SDA tubes were examined for growth once in two days during 1st week and twice a week thereafter up to 4 weeks. SDA tubes with

growth were processed by the standard methods.⁽⁶⁾ The yeast isolates were processed for identification by gram staining, germ tube test, inoculation on CHROM agar and morphologically on Corn meal agar, Carbohydrate fermentation and Carbohydrate assimilation test. Molds isolates were identified by conventional methods like colony morphology, Lactophenol cotton blue (LPCB) mount and Slide culture.

Results

A total of 241 sputum samples were received out of which 158(65.56%) were found to be positive for fungal isolates on culture. Majority of fungal isolates were obtained in the age group of 41-60 years of age and male-to-female ratio was 1.5:1. Most of the fungal isolates were obtained from indoor patients (73.41%). The maximum number of isolates were obtained from Chest and TB (58.62%) followed by Medicine ward (22.41%) and Intensive care unit (18.96%). [Fig.1]

Fig.1 Ward wise distribution of fungal isolates from indoor patients-

Ward	Number of Isolates	Percentage
Chest and TB	68	58.62%
Medicine Ward	26	22.41%
Intensive Care Unit	22	18.96%

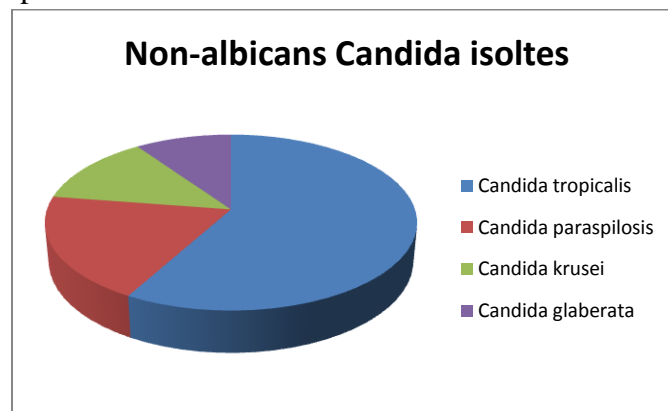
Amongst yeasts, *Candida albicans* (41.77%) was the predominant species followed by the non-albicans candida. The most common non-albicans Candida (n=31) was *Candida tropicalis*(11.39%) followed by *Candida paraspilosis* (3.79%), *Candida krusei* (2.53%) and *Candida glabrata*(1.89%).

Amongst molds, *Aspergillus fumigatus* (17.72%), was the most common species followed by *Aspergillus flavus* (10.75%) and *Aspergillus niger* (5.06%) and *Mucor.* (4.43%) One case of *Penicillium marneffeii* (0.63%) was also isolated from a patient having Tuberculosis from Chest& Tuberculosis ward.

Fig.2- Distribution of various fungal isolates in Respiratory Tract Infections-

Fungal isolate	Number of isolates	Percentage
<i>Candida albicans</i>	66	41.77%
<i>Candida tropicalis</i>	18	11.39%
<i>Candida paraspilosis</i>	6	3.79%
<i>Candida krusei</i>	4	2.53%
<i>Candida glabrata</i>	3	1.89%
<i>Aspergillus fumigatus</i>	28	17.72%
<i>Aspergillus flavus</i>	17	10.75%
<i>Aspergillus niger</i>	8	5.06%
<i>Mucor</i>	7	4.43%
<i>Penicillium marneffeii</i>	1	0.63%

Fig 3: Distribution of Non-albicans Candida species.



Discussion

Pulmonary fungal infections are important infective processes which are being encountered in today's practice. Fortunately, we only encounter a few of these pathogenic fungi. With the wide use of broad-spectrum antibiotics, immunosuppressive and chemotherapy agents as well as the increased incidence of respiratory diseases, including chronic obstructive pulmonary disease, lung cancer and tuberculosis, the chances of encountering these diseases are steadily increasing. Though treatment is difficult, still, the results are encouraging. Diseases like opportunistic fungal infection if diagnosed early can be treated effectively so as to prevent progression to fibrotic stage and reduce the number of respiratory cripples.^[7]

The present study demonstrated that *Candida sp.* and *Aspergillus sp.* constitute the main fungi causing pulmonary mycosis and these findings are consistent with reports of Biswas et al and Khalidi et al.^[8,9] The most common fungi isolated in patients with fungal infection admitted in our critical care setting were *Candida albicans* (41.77%), followed by *Aspergillus fumigatus* (17.72%). Among the *non-albicans Candida spp.*, *Candida tropicalis* was most common isolate (11.39%). The preponderance of *Candida tropicalis* is consistent with observation in a study from Chandigarh.^[10]

Pulmonary lung infections were more common in males (60.75%) of adult age group as compared to females (39.24%). The data in our study is highly comparable with other studies from India.^[11]

For the diagnosis of pulmonary mycosis with *Aspergillus*, fungal culture was more sensitive compared to direct microscopy, which was similar to previous published report by Njunda et al. Around 1.5% of the suspected pulmonary tuberculosis patients with pulmonary Aspergillosis, which could not be diagnosed by direct microscopic examination, were later found to be positive with culture.^[12] In pulmonary mycosis due to *Candida sp.*, we found direct microscopy and culture both were useful to diagnose a patient with pulmonary candidiasis.

Rapid diagnosis of systemic fungal infections remains limited and culture detection of fungal isolates is often delayed because of slow growth of fungal isolates from clinical samples. KOH examination and fungal culture are good diagnostic methods for the identification of fungal elements from the clinical samples. Early detection of fungus by microscopic examination (KOH examination) helps early initiation of antifungal therapy which is critical in reducing the high mortality rate.

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