

Original Research Article

Spectrum of fungal infections at a tertiary care hospital in Haryana, India

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ABSTRACT

Background: In recent years, fungi have been emerging as a common infection in hospitalised patients of tertiary care centres. The climate of our country is well suited for a wide variety of fungal infections. Within the limited data available, an increased incidence of invasive candidiasis, aspergillosis and other dematiaceous fungi are reported at our tertiary care centre. This study was undertaken to know the prevalence of common fungal infections at a tertiary care hospital in a period of five years.

Methods: The various clinical samples received from the patients presenting with clinically suspected fungal infections were subjected to direct microscopy with potassium hydroxide (KOH) and Gram staining. All samples were inoculated in duplicate SDA with or without antibiotics.

Results: A total of 8450 suspected fungal etiology samples were received during the five years (2011-2015) included in the study. The most common sample was sputum 2502 (29.6%) followed by skin swabs 2175 (25.7%), urine 1302 (15.4%), blood 875 (10.35%) and BAL 810 (9.5%). Male to female ratio was 5:3. *Candida albicans* was the predominant isolate followed by *non-albicans candida*, *Aspergillus flavus*, *Aspergillus fumigatus* and dematiaceous fungi.

Conclusions: The fungal isolates, which used to be discarded as laboratory contaminants are playing a significant role in pathogenicity of many infections. These organisms are now capable of affecting immunocompromised as well as immunocompetent individuals.

Keywords: Aspergillosis, Candidiasis, Dematiaceous, Haryana, Immunocompromised

INTRODUCTION

Recent studies related to fungal infections reveals that yeast and moulds have emerged as important pathogens. An increase in size of the population at risk, which includes HIV infected individuals, transplant recipients, cancer patients, those who are on immuno suppressives, prolonged hospitalization and on broad spectrum antibiotics and those who undergo various invasive procedures, have altered the incidence and prevalence of the fungal infections.¹ Over the last few decades the

epidemiology of the fungal infections has changed. The fungal isolates, which used to be discarded as laboratory contaminants are playing a significant role in pathogenicity of most infections. These organisms are now capable of affecting not only the immunocompromised patients but also healthy immunocompetent individual. Hence, this retrospective study was undertaken to find the prevalence of fungal infections and characterise the common fungal species isolated in this tertiary referral centre.²

METHODS

The study was conducted in Department of Microbiology, PGIMS Rohtak for a period of five years from January 2011 to December 2015.

Samples were received from patients of all age groups presenting with clinically suspected fungal infections. Samples were collected under aseptic precaution and were analysed by direct microscopy [KOH and Gram stain] and culture. Direct microscopic examination to visualize the presence of fungal elements or any budding yeast cells was done using 40% KOH for nail clipping and 10% KOH for rest other samples (corneal scraping, skin scraping, hair, pus etc). Gram staining was done to look for gram positive yeast cells.^{3,4} Culture of all samples were done 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. Identification of fungi was done by macroscopic examination of fungal growth. Lactophenol cotton blue mount was made to observe characteristics such as mycelium, conidium types and hyphae. The yeast isolates were identified by gram stain and germ tube test.^{5,6}

RESULTS

Total samples received in this lab was 8055 out of which maximum were respiratory samples (3379) (sputum >BAL >pleural fluid) followed by pus (2175), urine (1302), blood (875), eye (334), CSF (47), nail clips (47), and others (43) (Figure 1).

Fungi was isolated from 2006 samples, out of which maximum were isolated from respiratory samples (983) followed by pus (402), blood (277), urine (267), eye (39), CSF (24), nail clips and others (14) (Figure 2).

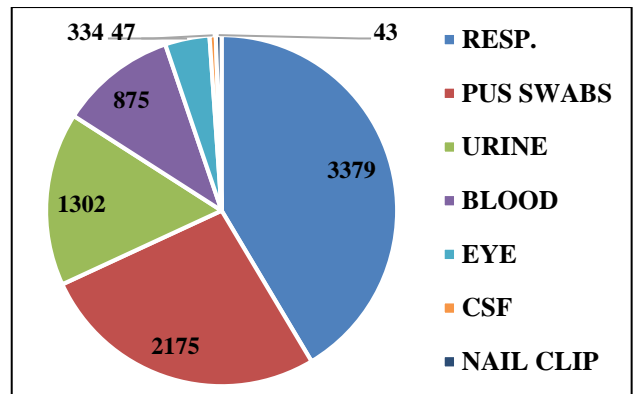


Figure 1: Distribution of clinical samples (n=8055).

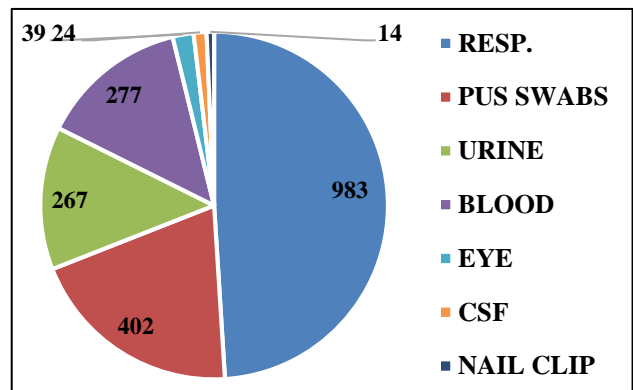


Figure 2: Total positive samples (n=2006).

Table 1: Age distribution of the sample.

Age range	Total	Positive	% Positive
0-1yr	1322	297	22.4%
2-15yrs	989	177	17.8%
15-60yrs	3022	876	28.9%
>60yrs	2611	636	24.35%

Table 2: The frequency distribution of various clinical samples.

Fungus	Resp.	Urine	Pus	Eye	Blood	CSF	Nail	%
Mycelium								
<i>A.flavus</i>	87	32	58	6	9	0	1	9.62%
<i>A.fumigatus</i>	42	21	23	7	7	2	2	5.18%
<i>A.niger</i>	47	12	26	4	7	0	09	5.23%
<i>Alternaria</i>	39	12	17	0	0	1	0	3.44%
<i>Curvularia</i>	47	11	18	0	0	2	0	3.89%
<i>Penicillium spp.</i>	54	0	10	0	0	0	0	3.19%
<i>Fusarium</i>	3	0	9	22	0	0	0	1.69%
<i>T. mentagrophyte</i>	0	0	0	0	0	0	2	0.099%
<i>Rhizopus spp.</i>	1	0	1	0	0	0	0	0.099%
Yeast								
<i>Candida</i>	396	116	146	0	158	0	0	40.67%
non-albicans <i>Candida</i>	267	63	94	0	96	0	0	25.92%
<i>Cryptococcus</i>	0	0	0	0	0	19	0	0.95%
Total	983	267	402	39	277	24	14	

Maximum positive samples were from adults between age group 15-60 yrs followed by patients above 60yrs of age (Table 1). Males compared to females were affected the most in this study, with a male to female ratio of 5:3.

Predominant fungus isolated in this study was *Candida albicans* (40.67%) followed by non-*albicans Candida*, (25.92%) *Aspergillus flavus* (9.62%), *A. niger* (5.23%), *A. fumigatus* (5.18%), dematiaceous fungi such as *Curvularia* (3.89%), *Alternaria*(3.19%), *Penicillium spp.*(3.19%), *Fusarium* (1.69%) dermatophytes such as *T. mentagrophyte* and *Rhizopus spp.* (0.99%) (Table 2).

DISCUSSION

Fungi are widely distributed in nature and incidence of fungal infections has increased since the past two decades. These infections are usually insidious and their diagnosis and treatment is often delayed due to co-existing illnesses.¹

Our lab received a total of 8055 samples in a period of 5 years and 2006 (~25%) samples were positive for fungal growth.

Out of several samples collected, maximum positive samples were isolated from sputum followed by pus, blood and urine. These findings are consistent with Nageshwari et al. who also isolated fungus maximally from sputum (58.92%), followed by body fluids (13.98%).⁷

In this study males were most commonly affected by fungal infections with male to female ratio being 1.7:1. Similar findings were also seen in studies done by Aggarwal and Nawal et al, who in their study revealed male and female ratio to be 0.74:1 and 2.14:1 respectively.^{8,9}

Adults of age group 15-60 years were mostly affected in this study which could be explained by a higher incidence of physical activity and sweating in them. The temperature in Northern India is very high most of the time and higher temperature as well as body sweating facilitates fungal growth.⁹ However, in this study an increase in incidence of fungal infections are seen in infants and also in patients above 60 years of age. This may be caused by opportunistic fungus infecting immunocompromised host. Predominant fungus isolated in this study was yeast-like fungus followed by moulds and yeasts. Nageshwari et al, isolated *Candida albicans* 173 (51.4%) from majority of samples, followed by non *albicans Candida* 68 (20.23%), *Aspergillus spp*, *zygomycetes*, *Penicillium*, *Fusarium* and dermatophytes, similar to our study. However they also isolated dimorphic fungi, *Sporothrix* in 3 cases and *Blastomyces spp.* which was not seen in this study.⁷

Although the findings of this study match with many studies done across India, it differs significantly with some studies suggesting the role of geographical variation in clinical and mycological pattern.⁷

CONCLUSION

Rapid diagnosis of systemic fungal infections remains limited and culture detection of fungal isolates is often delayed due to slow or absent growth of fungal isolates from clinical samples. In developing countries majority of these diseases are due to low hygienic standards and the environment.

KOH examination and fungal culture are good tools for the detection of fungal elements from the clinical samples, that's why they were selected as primary tools in this study. From this study, we found that the risk of fungal infection is increased in hospitalized patients and immune-compromised individuals as well as healthy individuals. Early detection of fungus by microscopic examination (KOH examination) helps early initiation of antifungal therapy which is critical in deducing the high mortality rate in these patients.

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Ethical approval: Not required

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