



MYCOLOGICAL PROFILE OF CLINICAL SPECIMENS OF A NEWLY ESTABLISHED TERTIARY CARE CENTRE IN NORTH INDIA – STUDYING THE EPIDEMIOLOGICAL TREND

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ABSTRACT

Background: Fungal infections are emerging as an important cause of morbidity and mortality in critical patients. For optimal therapy of fungal infections, it is crucial to understand the local etiology as they exhibit a wide range of diversity based on climatic or geographical factors. **Aim of Study:** This study was planned with an aim to study local fungal profile of various clinical specimens received in our Medical College Hospital. **Material and Method:** This study is conducted at AIIMS Raebareli. Samples were taken between August 2021 to October 2022. Total 460 samples were included in the study. Direct microscopy with 10% potassium hydroxide was done to visualize the presence of fungal elements, and Gram staining was done for any suspected yeast infection. India ink stain was done for cerebrospinal fluid. The samples were inoculated on Sabouraud's Dextrose Agar and kept at 22°C and 37°C. Fungal isolates were identified and documented. **Results:** Most common specimen was skin scrapping and isolate was Trichophyton 66.66% followed by Aspergillus, Candida and Fusarium. Among Trichophyton most common species were T mentagrophytes and T rubrum. Non albicans candida (58.33%) were common as compared to Candida albicans from pus/aspirates. More fungal infections were found in males 53.7% and in age group of 21-50 (90.5%). **Conclusion:** It is important to know the local etiology for proper management of fungal infections. The virulence of many illnesses is greatly influenced by the fungal isolates, which can now infect both immunocompetent and immunocompromised people.

KEYWORDS : Fungal; morbidity; mortality; profile; virulence

INTRODUCTION:

Medical Mycology has gained significant attention in recent years due to the increase in pathogenic fungi and the mycoses in immune-compromised hosts. Fungal pathogens are ubiquitous in nature and, only a few species are pathogenic to humans. The past few years witnessed an increase in the number of true pathogenic fungi and an emergence of various opportunistic fungi which were initially considered to be non-pathogenic. This shift in the host preference and Increase in fungal infections can be attributed to the immunocompromised states like transplant recipients, cancer patients, those who are on immunosuppressives, those who undergo prolonged hospitalization and are on broad spectrum antibiotics and those who undergo various invasive procedures [1]. Advances in medical and surgical therapies have helped clinicians in treating previously devastating or fatal diseases, resulting in increased longevity of immunocompromised individuals who become susceptible to various opportunistic fungi which were initially considered to be non-pathogenic or of low virulence. Infections in such patients are often severe, rapidly progressing, presenting difficulty in diagnosing them as clinical manifestations often mimic other common diseases.

Moreover, an increased incidence of antifungal resistance makes treatment difficult [2]. The recovery of aetiological agent from clinical specimens in culture media is considered the "gold standard", but it is often delayed because of slow growth rates of many fungal isolates. Successful treatment of fungal infections requires high index of clinical suspicion, knowledge on various aetiological agents and their susceptibility to available antifungal agents and familiarity with measures that can be taken to reduce the chances of

spread or re-infections. Skin infection due to dermatophytes has become a significant health problem affecting children, adolescents and adults. Mycetoma caused by filamentous fungi (Eumycotic mycetoma) and filamentous bacteria (Actinomycotic mycetoma) need to be differentiated by culture studies.[3,4] A correct diagnosis is important to initiate appropriate treatment and also essential for epidemiological purposes. In the background of immunosuppression, detection of these agents becomes mandatory for their effective management of mycoses to prevent further invasions.

This study was planned with an aim to study local fungal profile of various clinical specimens received in our newly established tertiary level Hospital.

MATERIAL AND METHODS:

The study was conducted in Department of Microbiology, at All India Institute of Medical Sciences, Raebareli, from August 2021-October 2022. Ethical approval was taken from the Institute's Ethics committee.

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 (skin scraping, hair, pus etc). Gram staining was done to look for gram positive yeast cells. [5,6] 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.[7,8]

RESULTS:

Total samples received in the Microbiology lab were 460 ;out of which maximum were skin scrapings (320), followed by hair (28), respiratory samples (21) (sputum >BAL >pleural fluid), Nail clips (18) pus (15), urine (14), blood (13), Ascitic fluid (2), tissue (2) etc. (Figure 1).

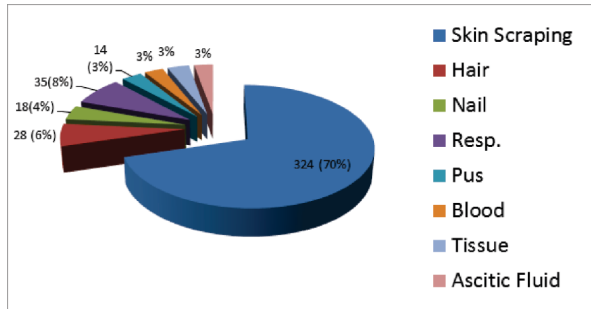


Figure 1: Distribution of clinical samples (n=460).

More fungal infections were found in males 53.73% and in age group of 14-60 (90.55%) (Table 1).

Age Group	Positivity Rate
<14 years	9.45%
14 years	90.55%

Gender	Positivity Rate
Male	53.73%
Female	46.27%

Fungi were isolated from 50 samples, out of which maximum were isolated from respiratory samples (23) followed by skin scrapings (12), urine (6), pus (4) etc. The predominant fungus was non albicans candida spp (26%), followed by dermatophytes such as *T. mentagrophyte* (20%), *T rubrum*(2%), *Candida albicans* (18%), *Aspergillus flavus* (12%), *A. niger* (10%), *A. fumigatus* (6%), dematiaceous fungi such as *Fusarium* (4%) was also isolated (Table 3) (figure 2 &3)

Fungus	Resp.	Pus	Tissue	Skin	Nail	Blood	Urine	%
Mycelium								
<i>A.flavus</i>	5	0	1	0	0	0	0	12%
<i>A.fumigatus</i>	3	0	0	0	0	0	0	6%
<i>A.niger</i>	4	1	0	0	0	0	0	10%
<i>Fusarium</i>	0	0	0	0	2	0	0	4%
<i>T. menta grophyte</i>	0	0	0	9	1	0	0	20%
<i>T rubrum</i>	0	0	0	2	0	0	0	4%
Yeast								
<i>Candida albicans</i>	4	1	0	1	0	1	2	18%
Non-albicans <i>Candida</i>	7	2	0	0	0	0	4	26%
Total	23	4	1	12	3	1	6	

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. [9] Our lab received a total of 460 samples in a period of 1 year 3

months and 50 (~11%) samples were positive for fungal growth. Out of several samples collected, maximum positive samples were isolated from sputum followed by skin scrapings, pus, urine and blood. These findings are consistent with Nageshwari et al. who also isolated fungus maximally from sputum (58.92%), followed by body fluids (13.98%).[10]

In this study males were most commonly affected by fungal infections with male to female ratio being 1.2:1 which is in between the findings 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. [11, 12] 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. [13]

Predominant fungus isolated in this study was non albicans *Candida* spp fungus followed by moulds. This finding is correlating with other studies where non-albicans spp. predominates like in, Europe, and also in the subcontinents of India. [14-17] However it is in contrast to Nageshwari et al, who isolated *Candida albicans* 173 (51.4%) from majority of samples, followed by non albicans *Candida* 68 (20.23%), dermatophytes, *Aspergillus* spp, *Fusarium* etc, similar to our study. However they also isolated dimorphic fungi, *Sporothrix* in 3 cases and *Blastomyces* spp. which was not seen in this study.[10]

The role of diagnostic mycology laboratory is important in the management of fungal infections. An understanding of fungal infections in each set-up will help greatly in improving diagnostic and therapeutic approaches. Non-albicans *Candida* infections are also increasing globally making speciation necessary. Culture and identification of mycotic infections to the genus and species level, is essential, for commencement of suitable antifungal therapy. [17]The clinician-microbiologist collaboration will help in improving patient care

CONCLUSION:

It is important to know the local etiology for proper management of fungal infections. 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 in early initiation of antifungal therapy which is critical in reducing the high mortality rate in these patients.

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Conflicts of interest : No

Ethics Approval:

Informed consent was obtained from all the patients and their legal guardians(in case of minors) regarding the publication of images and clinical information in the journal.They were informed of the confidentiality of the data ,however ,the anonymity cannot be guaranteed.

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