



## "MYCOLOGICAL STUDY OF RESPIRATORY TRACT SAMPLE IN A TERTIARY CARE HOSPITAL IN CENTRAL INDIA"

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### ABSTRACT

**Background:-** Respiratory tract Infections are the one of the commonest infections seen in the community and hospitalized patients. In immunocompromised patients, opportunistic fungal infections have become more common in recent years. The aim of the present study was to obtain Insight into the Mycological study and comparison between Culture and KOH Mount of respiratory tract infection patients. **Introduction:-** Respiratory tract Infections are the one of the commonest infections seen in the community and hospitalized patients. In immunocompromised patients, opportunistic fungal infections have become more common in recent years. KOH examination and culture on SDA are still the most common diagnostic methods use in research clinical laboratories. Thus, this study is carried out to compare KOH & fungal culture for diagnosis of respiratory fungal infection. **Aim:-** Detection of fungus from respiratory tract sample and Identification of grown fungus. **Material & Method:-** This study was a cross sectional study that was carried out between February 2022 to February 2023 in the department of microbiology of PCMS&RC Bhopal. Total 140 samples of suspected Respiratory tract infection were subjected to KOH mount examination & culture on SDA. Fungus was identified by conventional methods. **Result:-** Prevalence of fungal pathogen in respiratory tract infection was found to be 37.85%. KOH negative and culture positive were 26.41%. **Conclusion:-** Our study points out importance of fungal culture on clinically suspected fungal Respiratory tract infection, even though KOH examination oncomes out to be negative. Therefore, fungal culture is imperative for correct diagnosis and proper treatment.

**KEYWORDS :** RESPIRATORY TRACT, KOH MOUNT, FUNGAL CULTURE.

### INTRODUCTION:-

Respiratory tract Infections are the one of the commonest infections seen in the community and hospitalized patients. The common LRTIs include Bronchitis, Bronchiolitis, and Pneumonia and Pleural infections. These are seen frequently among immunocompetent as well as immunocompromised individuals<sup>1</sup>.

The increased prevalence of fungal pulmonary infections is largely due to awareness of these infections, Upsurge in immunocompromised patients, irrational use of broad-spectrum antibiotics corticosteroids and other immuno suppressant<sup>2</sup>.

Filamentous fungi are more common in patient of Cystic fibrosis with advanced lung disease<sup>3</sup>. Invasive Mycosis caused by yeast of the genus *Candida* are important causes of morbidity in immunocompromised and hospitalized patients<sup>4</sup>. In HIV-positive people, fungal respiratory infections are a leading cause of death and morbidity. From asymptomatic mucosal candidiasis to devastating widespread infections, the disease spectrum is wide<sup>5</sup>.

*Aspergillus* spores are found all throughout the world and can be cultured from grains, damp soil, and vegetation, or they can be a laboratory contamination. *Aspergillus fumigatus* causes the majority of human infections, followed by *Aspergillus flavus*, *Aspergillus niger*, *Aspergillus clavatus*, and *Aspergillus nidulans*<sup>6</sup>.

Most fungal infections are caused by *Candida* species, particularly *Candida nonalbicans*, and among filamentous fungi, *Aspergillus* spp is the most common, caused by *Aspergillus fumigatus*, *Aspergillus flavus*, *Aspergillus niger*, *Aspergillus clavatus*, and *Aspergillus nidulans*, followed by

other fungal organisms. The study's goal is to isolate and speciate various fungal pathogens from bronchial wash specimens. KOH examination and culture on SDA are still the most common diagnostic methods use in research clinical laboratories. Thus, this study is carried out to compare KOH & fungal culture for diagnosis of respiratory fungal infection.

### Methodology

This study was a cross sectional study that was carried out between February 2022 to February 2023 in the Department of microbiology of PCMS&RC Bhopal. Total 140 samples of Respiratory tract infection patients were included in the study. The Sample were subjected to KOH mount & culture,

### Wet Mount:-

The specimens were subjected to 10% KOH mount for presence of fungal hyphae, spores and yeast cells. It is used as a primary screening tool to detect the presence of fungal elements.

### Culture:-

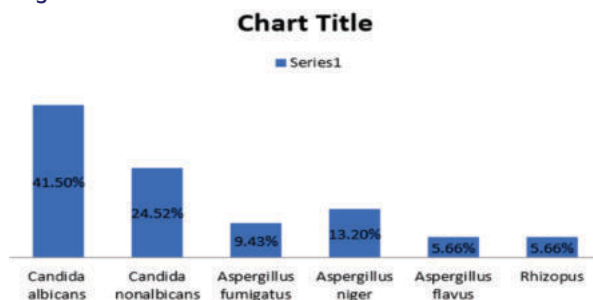
The specimens were cultured on Sabouraud dextrose agar (SDA) at 25°C and 37°C. Fungi grow relatively slow and cultures were kept incubated for at least three weeks and in some cases up to six weeks before being discarded as sterile. Usually, the positive results of culture were obtained within 7-10 days. In *Candida* and *Aspergillus* species, growth appear within 24-72 hours. Therefore, cultures were examined for the expected growth, daily for the first week and twice a week for subsequent period<sup>7</sup>. Fungus was identified by conventional methods, such as Lacto Phenol Cotton Blue (LPCB) Mounts

### Result:-

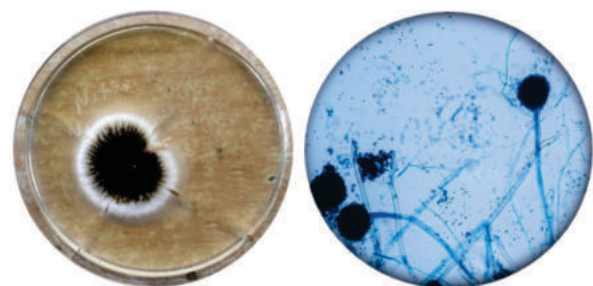
Total 140 respiratory samples were processed and 53 diagnosed for Fungal culture and 39 were for KOH mount.

Samples included with age group comprising from 1 to 60+ age years of age group in which 21-40 years was positive for Fungi and they were predominantly males. Prevalence of fungal pathogen in respiratory tract infection was found to be 37.85%. KOH negative and culture positive were 26.41%. Among the fungi isolated, candida albicans was more in number followed by non-albicans candida and aspergillus niger.

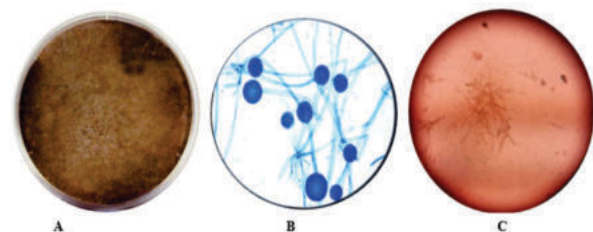
**Organism wise distribution n = 53**



**LPCB Mount Microscopy**



**A** – SDA Culture plate showing the growth of *Aspergillus niger*.  
**B** – LPCB mount showing septate hyphae along with conidiophores, vesicle, phialides, and conidia of the fungus.



**Colony of Rhizopus on SDA, LPCB Mount & KOH Microscopy**  
**A**– SDA Culture plate showing the growth of *rhizopus*.  
**B**– LPCB mount showing Presence of stolons and pigmented rhizoids, the formation of sporangiophores, and apophysate, columellate, multi spored, generally globose sporangia.  
**C**. Showing aseptate hyphae

**DISCUSSION**

In developing and developed countries of the world, fungi have emerged as major health challenge. Recent years have witnessed a global spike in the incidence of fungal infections due to an increase in patients who are immunocompromised. Many opportunistic fungi can cause life-threatening systemic infections in patients with compromised immune system. Fungus is one of the important causes of RTI. Identification of the fungal species is important, as it helps in the initiation of specific antifungal therapy which improves the outcome of treatment. The respiratory tract is continuously exposed to fungal spores present in the environment, and studies showed viable fungus present in the high rates in bronchial sputum cultures and pleural fluid, even in healthy

subjects. Fungal presence is commonly considered as colonization, but it may be an important extrinsic trigger for upper and lower airway allergic diseases especially in patients with asthma, chronic rhinosinusitis (CRS), cystic fibrosis and allergic rhinitis.

Study carried out by M.Akilamani et. Al<sup>8</sup> Found that 41% of all lower respiratory clinicals specimens were culture positive and 59% were negative among cases of chronic respiratory diseases. KOH preparation serves as a good screening test for determining the presence of fungal infection. Direct KOH examination helps the clinician to start early treatment and management. In present study, 39 positive samples showed fungal filaments under KOH mount. Out of them 61.53% (24/39) were male patient and 38.46% (15/39) were female patient. This is in concordance with the study of Chandwani J et. Al<sup>9</sup> who also reported maximum cases in males patient 19/180 (66.1%)

Our study shows that according to age wise distribution large number of populations fall under age group 20-40 (19 patients) (35.84%) followed by age group 41-60 (13 patients) (24.52%) which correlated with the study of Shrimali et. Al<sup>10</sup> mentioned that in their study the most affected age group were 21-40 years (39%) followed by 41-60 years (19.21%). People of Age group of 20 -40 years have more active life style and thus tend to contact fungal lower respiratory tract infections. and this trend decreases after age more than 61. As people have more sedentary life style.

Out of 140 respiratory samples, most common sample was Sputum 73 (52.14%) followed by BAL 13 (9.28 %), Endotracheal tube 23 (16.42 %), Nasal swab 11 (07.85%), Pleural fluid 17(12.14%) and Bronchial washing 03 (02.14%) expected similar result were documented by Jayaram A et. Al<sup>11</sup> who also reported out of 70 clinical specimens the most common specimen was sputum 30 (42.8%) followed by BAL 26 (37.14%), Endo tracheal secretions 12 (17.1%) and pleural fluid 2 (2.86%). In this study (53) 37.85% of respiratory samples were positive on fungal culture and sputum samples 24 (45.28%) showed the highest positivity among all samples. This was similar to the study conducted by Jayaramet. Al<sup>11</sup> where sputum samples showed 30 (42.8 %) positivity

In our study shows 15 (28.30 %) of 53 samples were aspergillus spp. while 38 (71.69%) of positive culture are other than aspergillus spp. Out of 53 positive culture 05 culture shows *Aspergillus fumigates* ,07 are *Aspergillus niger*, 3 culture shows *Aspergillus flavus*. In another study carried out by Shrimali G et. al who also reported 29 of 100 (29%) samples are *Aspergillus* spp. while 32% of positive culture are other than *Aspergillus* spp.

**CONCLUSION:-**

In present study, Prevalence of fungal infection was 37.85% in respiratory tract infection, which is a quiet high number, thus fungal infection should always be in mind while starting empirical therapy and fungal culture should be considered. In our study KOH sensitivity was 27.85% and we could detect more fungal infection through culture (37.85). Thus, this study recommends that even though KOH comes negative, Culture should be done.

**REFERENCES:-**

1. Sripriya, C.S., S. Thasneem Banu, R. Deepa and Ratnapriya, N. 2017. Mycological Profile of Bronchial Wash Specimens in Patients with Lower Respiratory Tract Infections. Int.J.Curr.Microbiol.App.Sci.6(11): 176182. doi:https://doi.org/10.20546/ijcmas.2017.611.02
2. U Maduakor, N Onyemelukwe, M Ohanu, U Okongwu, C Uchenna, I Okonkwo. Prevalence Of Aspergillus Species In The Sputum Samples Of Patients With Lower Respiratory Tract Infections In A Tertiary Hospital In Enugu, Nigeria. The Internet Journal of Infectious Diseases. 2020 Volume 18 Number 1
3. Patrick Vandeputte, Amandine Rougeron, Sandrine Giraud, Thomas Dugé de Bernonville, Ludovic Duvaux, Amandine Gastebois, Developing

- collaborative works for faster progress on fungal respiratory infections in cystic fibrosis
4. Volker Rickerts, Oliver A. Cornely, Diagnosis and therapy of *Candida* infections: joint recommendations of the German Speaking Mycological Society and the Paul-Ehrlich-Society for Chemotherapy
  5. Nitya Vyas, Saroj Hooja, Babita Sharma, Rakesh Maheshwari. Mycological Profile of Sputum of HIV Positive Patients with Lower Respiratory Tract Infection and its Correlation with CD4+ T Lymphocyte Count DOI:
  6. Levy, H., Horak, D. A., Tegtmeier, B. R., Yokota, S. B., Forman, S. J. 1992. The value of bronchoalveolar lavage and bronchial washings in the diagnosis of invasive pulmonary aspergillosis. *Respiratory medicine*, 86(3), 243-248.
  7. JagdishChander et.al: Text book of medical mycology: fourth edition :2018
  8. M.Akilamani, A study on the pattern of fungal infections and clinical profile in immunocompromised patients with special reference to characterization and molecular study of candida species in a tertiary care hospital 2018
  9. Chandwani J, Vyas N, Hooja S, Sharma B, Maheshwari R. Mycological profile of sputum of HIV positive patients with lower respiratory tract infection and its correlation with CD4+ T lymphocyte count. *Journal of clinical and diagnostic research: JCDR*. 2016 Sep;10(9):DC28.
  10. Anuradha S, Samaddar A, Maurya A, Hada V, Narula H, Shrimali T, Gupta N, Kumar P, Singh K, Nag VL. Analysis of Blood Culture Data Influences Future Epidemiology of Bloodstream Infections: A 5-year Retrospective Study at a Tertiary Care Hospital in India. *Indian Journal of Critical Care Medicine: Peer-reviewed, Official Publication of Indian Society of Critical Care Medicine*. 2021 Nov;25(11):1258.
  11. Jayaram A, Sareen K, Dedwal A, Sushma Pednekar, Sunil Bhamare, Swati Mulshingkar, Rajesh Karyakart Mycological Profile of Respiratory Tract Samples in a Tertiary Care Hospital *International Journal of Health Sciences and Research* Vol.11; Issue: 8; August 2021