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RETROSPECTIVE STUDY OF MYCOLOGICAL PROFILE OF RESPIRATORY INFECTIONS IN FIVE CONSECUTIVE YEARS IN A TERTIARY CARE HOSPITAL

Microbiology

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ABSTRACT

Background: Respiratory fungal infection is a severe clinical problem, especially in patients with compromised immune functions. Aspergillus, Cryptococcus, Pneumocystis, and endemic fungi are major pulmonary fungal pathogens. Moreover, fungal infections in this patient population pose challenges in diagnosis and management.

Objective: The retrospective analysis for a period of five years was undertaken to know the prevalence of common respiratory fungal pathogen in a tertiary care hospital.

Material And Methods: The present study was conducted in Mycology section of Microbiology department, SMS Medical College and Attached Hospitals, Jaipur in year 2016. It's a retrospective study of total five years from year 2012 to 2016 which involves routine clinical samples (sputum and bronchio alveolar lavage) which were collected from the patients presenting with clinically suspected fungal infections. Direct microscopy with potassium hydroxide (KOH) and Gram's staining was done to visualize the presence of fungal elements. Samples were inoculated on Sabourauds dextrose agar (SDA) with antibiotics and incubated at 25 -37 degree celsius for maximum period of 21 days and were observed for fungal growth.

Results: Out of 4,259 samples, 1091(25%) samples were KOH positive of which 677(62%) were male and 414(38%) were female. Most cases of respiratory fungal infection were seen in elderly population (age above 50) , in which male preponderance was seen. Candida (44%) was the most common isolate followed by Aspergillus fumigatus(14%), Aspergillus niger(12%), Penicillium species(6.4%), Alternaria species(3.9%), Fusarium species(2.9%), Fonsecaea species(1.9%), Drechslera species(1.9%) and Curvularia species(1.3%).

KEYWORDS

Respiratory fungal pathogens, Immunocompromised, Candidiasis, Aspergillosis, Penicilliosis, temperature variation.

INTRODUCTION

Respiratory fungal infection is a severe clinical problem, especially in patients who are immunocompromised. *Aspergillus, Cryptococcus, Pneumocystis,* and endemic fungi are major pulmonary fungal pathogens.[1] Moreover, fungal infections in this patient population pose challenges in diagnosis and management.

Pulmonary mycoses are among the most dreadful infections encountered in immunocompromised patients. Different groups of immunosuppressed patients are susceptible to different fungal infections. For example, the most common opportunistic fungal pathogens which cause invasive pulmonary mycoses in HIV-infected patients are cryptococcosis, pneumocystis pneumonia, histoplasmosis, blastomycosis, and coccidioidomycosis.[2]. Aspergillosis occur in advanced stages of HIV infection, when patient present with significant neutropenia , solid organ or hematopoietic stem cell transplant recipients, and haematological malignancies [3].

In addition, Aspergillosis is the most common cause of invasive pulmonary mycoses among intensive care unit patients [4] and is often fatal at the anastomotic site of a lung transplant.

By contrast, although colonization with *Candida spp*. is common, pulmonary infections are rare, occurring only in the setting of disseminated candidiasis, profound aspiration of infected material, or at an airway anastomosis [5]. At last, zygomycosis are also important emerging fungal lung diseases along with Aspergillosis which occur in among immunocompromised individuals .[6]

As the global warming is increasing, the temperature variation is giving rise to wide variety of fungal infections especially in tropical countries where humidity and temperature favours the fungal growth. Therefore in this study a retrospective analaysis was undertaken to know prevalence of common fungal infection in our tertiary care setup.

OBJECTIVE

To analyze the prevalence of common respiratory fungal pathogens, retrospectively over a period of five years in a tertiary care hospital.

MATERIAL AND METHODS

The present study was conducted in Mycology section of Microbiology department, SMS Medical College and Attached Hospitals, Jaipur in year 2016. It's a retrospective study of total five years from year 2012 to 2016 which involves routine clinical samples (sputum and bronchio alveolar lavage) received in our laboratory from the patients presenting with clinically suspected fungal infections. Direct microscopy with potassium hydroxide (KOH) and Gram's staining was done to visualize the presence of fungal elements . Samples were inoculated on two different culture media: one on sabourauds dextrose agar (SDA) with gentamycin and chloramphenicol and the other with cycloheximide to inhibit bacterial contamination. Cultures were incubated at 25- 37degree celsius temperature for maximum period of 21 days and were observed twice weekly for presence of any fungal growth. Further identification of fungus was done by preparing Lactophenol cotton blue (LCB) mounts and microslide culture technique.

RESULTS

- **Table 1 & Fig : 1** depicts out of 4259 samples , 1091(25%) samples were KOH positive
- There were 677 (62%) male and 414 (38%) were female.

Table:1 Showing Total Number Of KOH Positive Samples.

Year	No. of Samples	No. of Positive (%)
2012	777	323 (29.6%)
2013	700	175 (16.04%)
2014	880	218 (19.98%)
2015	916	171 (15.67%)
2016	986	204 (18.69%)
Total	**4,259**	**1,091**

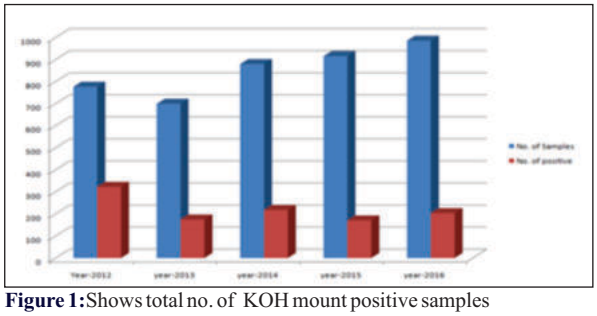


Figure 1: Shows total no. of KOH mount positive samples

• **Fig:2** shows age wise distribution of cases. In our study, most cases of respiratory fungal infection were seen in elderly population (age above 50) , in which male preponderance was seen.

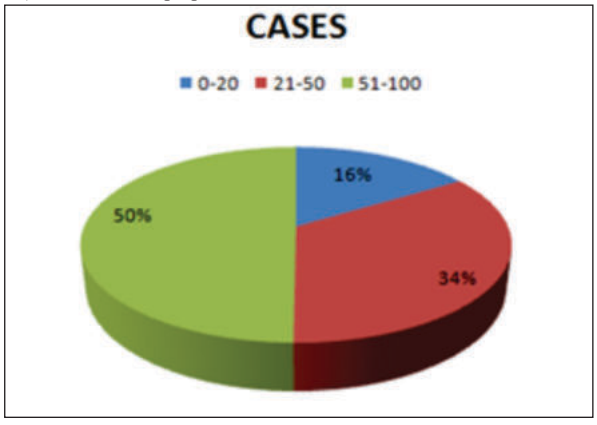


Figure 2: Shows Age Wise Distribution Of Cases

· Out of 693 samples for fungal culture 477(68.8%)were positive for fungal isolates**.[Fig:3]**

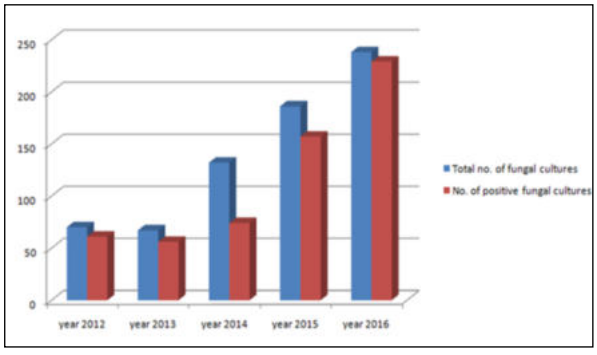
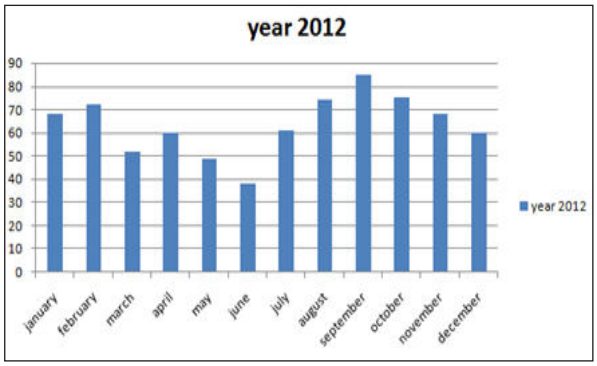
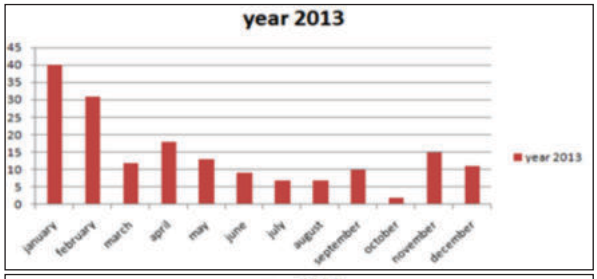


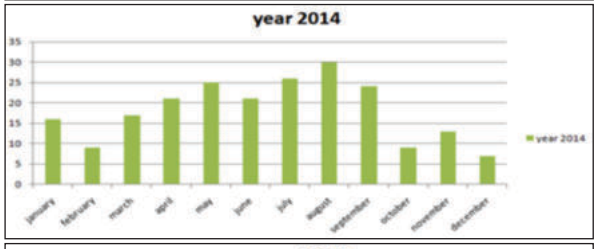
Fig:3- Graph Showing Fungal Culture Positivity In 5 Consecutive Years

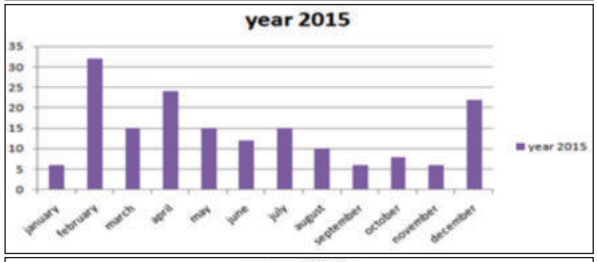
· *Candida* (44%) was the most common isolate followed by *Aspergillus fumigatus(14%*), *Aspergillus niger(12%*), *Penicillium* species(6.4%), *Alternaria* species(3.9%), *Fusarium* species(2.9%), *Fonsecaea* species(1.9%), *Drechslera* species(1.9%), *Curvularia* species(1.3%).

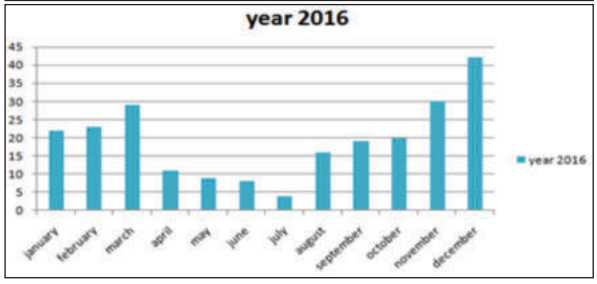
Seasonal Trends











DISCUSSION

Candida species as known so far is the most common fungal pathogens in humans. Among 8-10% of all nosocomial infections caused by fungal pathogens, 80% are attributable to *Candida* spp. The clinical significance of the detection of *Candida* spp. in the respiratory tract is increasingly uncertain.[7]Prominent risk factors for acquisition of *Candida* in the respiratory tract include exposure to antibiotics, critical illness, immune compromised status, use of mechanical ventilation and hospital or intensive care unit stay [8] Similarly in our study majority of fungal isolates were of *Candida species*(44%).

In this study it was observed that 26% of fungal isolates were of ***Aspergillus*** *species. Aspergillus fumigatus being common (14%) followed by Aspergillus niger (12%). Aspergillus* is usually considered harmless but the individuals with suppressed immune systems are more prone to develop infections like mycotic keratitis, otomycosis, nasal sinusitis, and respiratory allergic reactions. The infection occurs after inhalation of spores and the disease caused is **Aspergillosis.** Sometimes outbreaks occur in hospitalized patients and are associated with hospital construction or renovation, which can increase the amount of airborne *Aspergillus*, resulting in respiratory infections or surgical site infections in high-risk patients**.** [9,10] A retrospective analysis of over 25,000 samples from more than 600 cystic fibrosis(CF) patients by the German National Reference Center revealed that around 35% of CF patients were colonized by ***Aspergillus*** **spp**. [11]

Although Candida and Aspergillus contribute to majority of fungal pathogens , recently in past few years other moulds like ***Penicillium***, ***Alternaria*** **and** ***Fusarium*** have gained interest in immunocompromised patients. In a case study done by Geltner Christian [12], *Penicillium chrysogenum* was isolated in organ transplant patient which is reported to be most common fungi causing type I and III allergies, such as asthma or hypersensitivity pneumonitis.

There were 3.9% of *Alternaria species* which were isolated in our study. Carolina Percopo et al [13] in ther study illustrated that how exposure to spores from the saprophytic plant pathogen, ***Alternaria*** has been associated with the development of asthma and allergic rhinitis, notably in warm and arid climates [14,15].

There have been only few studies where ***Curvularia*** **and** ***Drechslera*** have been identified as pathogens causing respiratory disease. Although these are present ubiquitously in environments and are found as contaminants in laboratory specimens but in some occasions have been associated with human and animal disease. McAleer R et al [16] reported Allergic Bronchopulmonary Disease caused by *Curvularia lunata and Drechslera hawaiiensis* in their study. Although we reported only 1.3% and 1.9% of *Curvularia and Dreschleria* respectively but one should not forget that significance is given to their isolation if their mycelium is seen under microscopy of clinical material and the same fungus is isolated repeatedly.

Last but not the least we also observed a seasonal trend during the years 2012-2016. Very high humidity especially during the summer may explain the high prevalence of fungal disease during the year 2012 and 2014.[17]

CONCLUSION

- There has been an increasing incidence of pulmonary fungal infection at our hospital in the past five years.
- The most frequently encountered isolate were *Candida* species, followed by *Aspergillus* species and *Penicillium* species.
- *Aspergillus* species were also most frequently encountered in either nosocomial or community-acquired patient groups, which indicates that *Aspergillus* species could be important pathogens of severe pulmonary fungal infection.
- Acute invasive fungal infection is associated with a much higher mortality rate for patients with nosocomial infection or complicating respiratory failure.
- Early diagnosis with prompt antifungal therapy, or even with surgical intervention, might be warranted to save patients' lives.

REFERENCES

1. Li Z Lu G and Meng G (2019) Pathogenic Fungal Infection in the Lung. Front. Immunol. 10:1524. doi: 10.3389/fimmu.2019.01524
2. Wheat, J. (1995) Endemic mycoses in AIDS: a clinical review. ClinMicrobiol Rev 8: 146–159.
3. Fernanda P. Silveira, Shahid Husain, MD, Fungal infections in solid organ transplantation, *Medical Mycology*, Volume 45, Issue 4, June 2007, Pages 305–320, https://doi.org/10.1080/13693780701200372
4. Shoham, S. (2010) Invasive fungal infections in the ICU. *J Intensive Care Med* 25: 78–92.
5. Peter G. Pappas, Carol A. Kauffman, David R. Andes, Cornelius J. Clancy, Kieren A. Marr, Luis Ostrosky-Zeichner, Annette C. Reboli, Mindy G. Schuster, Jose A. Vazquez, Thomas J. Walsh, Theoklis E. Zaoutis, Jack D. Sobel, Clinical Practice Guideline for the Management of Candidiasis: 2016 Update by the Infectious Diseases Society of America, *Clinical Infectious Diseases*, Volume 62, Issue 4, 15 February 2016, Pages e1–e50, https://doi.org/10.1093/cid/civ933
6. Ribes JA, Vanover-Sams CL, Baker DJ. Zygomycetes in human disease. ClinMicrobiol Rev. 2000 Apr;13(2):236-301. doi: 10.1128/CMR.13.2.236. PMID: 10756000; PMCID: PMC100153.
7. Kathryn M Pendleton, Gary B Huffnagle, Robert P Dickson, The significance of *Candida* in the human respiratory tract: our evolving understanding, *Pathogens and Disease*, Volume 75, Issue 3, April 2017, ftx029, https://doi.org/10.1093/femspd/ftx029
8. Fidel PL Jr Distinct protective host defenses against oral and vaginal candidiasis *Med Mycol* 2002 40 359 75.
9. Weber DJ, Peppercorn A, Miller MB, Sickbert-Benett E, Rutala WA. Preventing healthcare-associated *Aspergillus* infections: a review of recent CDC/HICPAC recommendationsexternal icon. Med Mycol 2009; 47S1: S199-209
10. Vonberg RP, Gastmeier P. Nosocomial aspergillosis in outbreak settingsexternal icon. J Hosp Infect. 2006 Jul;63(3):246-54.
11. Renner S, Nachbaur E, Jaksch P, Dehlink E. Update on Respiratory Fungal Infections in Cystic Fibrosis Lung Disease and after Lung Transplantation. J Fungi (Basel). 2020 Dec 21;6(4):381. doi: 10.3390/jof6040381. PMID: 33371198; PMCID: PMC7766476.
12. Geltner, Christian1; Lass-Flörl, Cornelia2; Bonatti, Hugo3; Müller, Ludwig4; Stelzmüller, Ingrid5 Invasive Pulmonary Mycosis Due to Penicilliumchrysogenum, Transplantation Journal: February 27, 2013 - Volume 95 - Issue 4 - p e21-e23 doi: 10.1097/TP.0b013e31827ff214
13. Percopo CM, Ma M, Mai E, et al. Alternariaalternata Accelerates Loss of Alveolar Macrophages and Promotes Lethal Influenza A Infection. Viruses. 2020;12(9):946. Published 2020 Aug 27. doi:10.3390/v12090946
14. O'Hollaren M.T., Yunginger J.W., Offord K.P., Somers M.J., O'Connell E.J., Ballard D.J., Sachs M.I. Exposure to an aeroallergen as a possible precipitating factor in respiratory arrest in young patients with asthma. N. Engl. J. Med. 1991;324:359–363. doi: 10.1056/NEJM199102073240602.
15. Fukutomi Y., Taniguchi M. Sensitization to fungal allergens: Resolved and unresolved issues. Allergol. Int. 2015;64:321–331. doi: 10.1016/j.alit.2015.05.007.
16. McAleer R, Kroenert DB, Elder JL, Froudist JH. Allergic bronchopulmonary disease caused by Curvularialunata and Drechslerahawaiiensis. Thorax. 1981;36(5):338-344. doi:10.1136/thx.36.5.338
17. El Kichaoui, Abboud. (2006). Prevalence and Seasonal Variation of Fungal Diseases Among Inhabitants of Parts of Gaza-Palestine. 2. 25-31.