An aeromycological study of diagnostic microbiology laboratory at a tertiary care center

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Objectives: To evaluate the aeromycology of diagnostic microbiology laboratory at a tertiary care center.

Methods: This is an ecological prospective analytical study. The pilot study was conducted at a diagnostic microbiology laboratory in which the Bacteriology section and Micrology section were the study units. One indoor and one outdoor communal area were taken as community controls and histopathology lab was taken as Laboratory control. The sampling was done every fortnight for a period of 1 year from March 2021 to February 2022.

Environmental air samples were collected using the pancreatic plate method based on sedimentation on 90 mm Sabouraud Dextrose Agar plates. The plates were exposed for 30 mins at a height of 1 m and a distance of 1 m from the wall as per standard recommendations.

After sample collection, plates were incubated at 25°C for a maximum of 3 weeks or till the colonies were countable. The colonies were counted and the total CFUs/m³ was calculated using the Omeliansky Formula. The identification of the isolates was done using standard mycological protocols. Statistical analysis using paired student t-test was also performed.

Results: A total of 53 types of fungi were isolated in the study belonging to the following genera: Aspergillus, Alternaria, Curvularia, Bipolaris, Cladosporium, Penicillium, Pencillium, and Mucor. In the Bacteriology section, the highest frequency of A. flavus (59%) followed by A. fumigatus (26.11%) while in the mycology section the highest frequency of A. flavus (59%) followed by A. fumigatus (46%) was observed.

Certain fungal species known to cause serious infections like A. flavus, Mucor spp., Penicillium spp., Cladosporium spp., were isolated only in the laboratory environment and were absent in the Community Control.

The total CFUs/m³ ranged from 24.11 to 576.64 in mycology section and 26.11 to 419.37 in Bacteriology section while in the indoor community control the range was between 26.11 to 255.89 CFUs/m³ which was found to be statistically significantly lesser using T-test when compared to the laboratory environment. A seasonal variation with higher counts during the autumn months (September-October) was observed in both the labs. Seasonal variation in the distribution of fungi was observed especially in the case of Mucor spp.

Conclusion: Healthcare workers spending a significant time in this environment need to be made aware of the quality of air in laboratories and initiation of appropriate intervention to make the laboratory environment safer to work in as in this study
it was found that most pathogenic fungi were grown in a laboratory environment which is clearly due to the processing of clinical samples in labs as compared to the community environment.

The use of standard aseptic precautions, bioburden controls, fumigation of laboratories, and regular housekeeping activities would help to decrease the aerosols generated in the labs. However, aeromycology data from more such studies over a larger number of labs from different geographic areas needed to enable a better understanding of the role of the formulation of standards for a safer laboratory environment.

P357 Update on risk factors for Candida auris-Fungemia
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Objective: Induction with Candida species have been an increasing threat to hospital patients worldwide. During the last decade research has shown high mortality rates associated with candidemia and progressing drug resistance to NAC (non-alkaline Candida species). This study aims to identify risk factors for C. auris fungemia.

Patients and Methods: We retrospectively analyzed patient data with at least one C. auris or C. albiacns positive blood culture at Auen University Hospital between 2008–2020.

Relevant categories consisted of age, underlying condition, central venous catheters (CVC), steroids, leukopenia (<4000/μL), diabetes, and fungitumour, hospital ward, and outcome.

We used the Chi-square test to compare categorical variables. P-values were considered significant <0.05 and highly significant <0.01.

Results: From 1380 patients who tested positive for Candida spp. between 2008-2020, 49 were positive for C. auris and 786 for C. albicans.

Candida auris presented as the leading species (57.1%), followed by C. glabrata (23.5%), C. parapsilosis (8%), C. tropicalis (9.1%), and C. albicans (2.9%). A total of 67.6% of patients were located at ICU. Incidence rates for Candida positive blood cultures increased from 1.9% to 10.0%. Candida auris was most common in patients 50-60 years of age.

In both groups, overall survival was identical (52.2% C. auris/53.4% C. albicans). For C. auris correlation between outcome and antifungal treatment was highly significant (P = 0.04). A total of 20% more C. auris infected human-ontology patients died than in the C. albicans group (62.5% C. auris/65.5% C. albicans). In all, 60.0% of C. auris patients on ICU died. In the C. auris group all patients with CVC died and all patients without survived.

Conclusions: Candida-positive blood cultures increased from 1% in 2008 to 10% in 2020.

Three major risk factors for C. auris fungemia were found: CVC, human-ontology malignancies, and leukopenia.

P358 Candida auris on common medical supply surfaces under different environmental conditions
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Background: Candida auris is an emerging multidrug-resistant pathogenic yeast. The increasing frequency of C. auris outbreaks is prompting alarm worldwide. This yeast survives and spreads on contaminated medical supplies, resulting in hospital outbreaks. To learn more about the yeast’s spreading behaviors and transmission, we studied its persistence and survival on a variety of medical/dental surfaces under diverse environmental conditions.

Methods: A total of 104 CFU/mL solutions of four Candida species, including C. albicans, C. auris, C. parapsilosis, and C. glabrata, were inoculated into different 2 x 2 cm sheets of cotton textiles, polystyrene, paper, aluminum, glass, latex, and dental Sabouraud dishes agar. Inoculated sheets were incubated at various temperatures and subjected to light and darkness at 5, 7, 13, 15, 30, 45, 60, and 120-day intervals. After culture of the sheets on Sabouraud dishes agar plates, the viable CFU of yeasts were counted.

Results: All four species remained alive on all surfaces for at least 1 week under ambient and refrigerated temperatures, darkness, and light exposure. However, only latex and polystyrene surfaces maintained viable C. auris and C. parapsilosis for a maximum of 50 days at ambient temperatures and darkness. C. auris survived on dental Sabouraud dishes agar sheets for >4 weeks.

Conclusions: Candida auris and other pathogenic yeasts can survive on a variety of medical surfaces for extended periods of time. Latex and polystyrene devices are the best medical matrixes for yeast permanence. If C. auris has access to organic and nutritional components, its survival can be greatly increased. To prevent C. auris transmission, appropriate disinfection and decontamination methods should be considered.

P361 Demystifying the NIH grant application process for international investigators
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The National Institutes of Allergy and Infectious Diseases (NIAID) funds one of the largest medical microbiology research portfolios. The portfolio includes the major human fungal pathogen and covers basic fungal biology and the more translational areas of therapeutics, vaccines, and diagnostics. NIAID utilizes many grant mechanisms that are open to US and international researchers. These include investigator-initiated applications (R01, R21, and R15) and targeted announcements for fungal research. Additionally, NIAID has a suite of preclinical services supporting therapeutic, diagnostic, and vaccine development. These services are free and available to investigators in academia, not-for-profit organizations, industry, or governments worldwide. The NIH grant application process can be complex. Tips and tricks for navigating the NIH grant application process and preclinical services will be discussed.

P362 Seasonal trend of fungal flora in veterinary care hospital in North India
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Objective: The study was conducted to assess the seasonal variation of fungal flora in hospital water of a tertiary care hospital in North India.

Methods: A total of 200 water samples from the main reservoir, overhead and underground tanks, and taps of critical care units of the hospital were collected. The water samples were filtered by membrane filtration technique (0.22 microns) and cultured on dichloran red-Bengal agar media and with brain heart infusion. The plates were incubated for up-to 15 days, and fungal colonies received were sub-cultured on Sabouraud Dextrose Agar and identified by phenotypic methods. Yeasts were identified by Matrix Assisted Laser Desorption Ionization Time of Flight (MALDI-TOF-MS).

Results: Mycological fungi were isolated from 100% of the water samples which included Alternaria, Cladosporium, Nigrospora, Penicillium, Aspergillus, Paecilomyces, Scopulariopsis, and Mycopsis as depicted in Figure 1. Different fungi were prevailing in different water storage units like: Advance oxy center—A. fumigatus, A. flavus, Penicillium spp., Alternaria spp. Advance trauma Center—Cladosporium spp., Alternaria alternata, Penicillium spp., A. fumigatus, A. niger, A. fumigatus, A. flavus, Penicillium spp., Alternaria alternata, F. oxysporum filtrum. The seasonal variations of fungal isolation depicted in Figure 2. Isolation rate of Aspergillus spp was 39% in winters, 31% in post-monsoon, 25% in summers. Isolation rate of Penicillium spp was 19% in post-monsoon, 16% in winter and 11% in summers. Maximum number of dermatomycoses fungi were isolated in the summer season with isolation rate of 35% in summers as compared to 21.5% in post-monsoon and 19% in winters.

Four yeast isolates were Rhodotorula, Trichosporon, and Ustilago. Maculatus isolates rarely included Rhizopus, Alternaria, Syn- cephalotus, and Mucor species. Fungal colony forming units in the water samples ranged from 95 to 450 colony forming unit/mL.

Conclusion: The distribution of fungi in hospital water showed diversity and seasonal variability. Aspergillus species were isolated in maximum number in the winter season, Penicillium species in post-monsoon season and dermatomycoses fungi in the winter season. Water as a source of fungal infection in critical care units, remains a relatively neglected area. Water supply could be a source of nosocomial fungal infections. Improving the quality of water by regular testing for fungal contamination and appropriate action to reduce its burden may reduce the hospital-acquired fungal infections.