Objective: Aspergillus fumigatus causes a variety of diseases in humans. The drugs recommended for treatment of Aspergillus fumigatus are the mold-active azole antifungals. However, a wide range of mutations in A. fumigatus confers azole resistance, which commonly involves modifications in the CyP51A gene, the target for azole antifungal drugs.

Methods: We investigated 255 clinical A. fumigatus isolates obtained from patients hospitalized at National Institutes of Health Clinical Center, Bethesda, Maryland, USA. The species-level identification of each isolate was evaluated by colony morphology; microscopic characteristics; matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF), and PCR-sequencing of the β-tubulin gene. We also studied sequence-based analysis of the CyP51A gene for the azole-resistant isolates. The azole antifungal susceptibility profile of each isolate was initially evaluated using 4-Well microtiter plate assay (MD, array). The minimum inhibitory concentration (MIC) for each isolate was determined by broth dilution method according to Clinical and Laboratory Standards Institute CLSI M38-A3 guidelines. The results of MIC values were compared with those to azole-resistant isolates.

Results: Of 255 A. fumigatus isolates, 12 grew on the media containing azoles, indicating an azole-resistant phenotype. The Azole resistance prevalence was recorded at 4.7%, all of azole-resistant isolates exhibited azole-resistance mutations in CyP51A gene. Our finding adds to the growing list of regions where acquired resistance in A. fumigatus is documented. Our results also indicate that 4-Well microtiter plate assay is a reliable tool for azole-resistance screening and the selection of isolates that require a full panel of antifungal susceptibility testing.

Results: Both natural phenols and antifungal drugs revealed various efficacies against clinical Candida species. The susceptibility to fluconazole and voriconazole was 100% for C. albicans, 90% and 99% for C. glabrata, and 90% and 100% for C. krusei isolates, respectively. The mean diameter of the inhibition zone was greater for fumigatus than c. albicans (19.59 ± 0.80 mm vs. 17.01 ± 0.43 mm), C. glabrata (18.87 ± 0.71 mm vs. 15.77 ± 0.57 mm), and C. krusei (18.15 ± 0.91 mm vs. 13.91 ± 0.14 mm) isolates tested.

Thymol showed more effective inhibition on adherence of all Candida species than other treatments. The mean relative adherence rates for C. albicans, C. glabrata, and C. krusei were 0.50, 0.60, and 0.64, respectively.

Conclusion: This study demonstrated significant inhibitory properties of thymol and carvacrol on the adherence and growth of azole-susceptible and -resistant Candida isolates. Also, thymol was more effective for preventing the adherence of yeast cells to polystyrene in comparison to carvacrol.

Poster Presentations

PDF1: Azole-resistant Aspergillus fumigatus among NIH hospitalized patients with underlying primary immunodeficiencies

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Poster session 1, September 21, 2012, 12:10 PM - 1:30 PM

Objective: Aspergillus fumigatus is a pathogenic fungus that causes various diseases in humans, including invasive pulmonary aspergillosis (IPA), which is one of the most common and severe infections caused by A. fumigatus. This study aimed to determine the prevalence and resistance patterns of A. fumigatus in clinical specimens from patients hospitalized at National Institutes of Health Clinical Center, Bethesda, Maryland, USA.

Results: Of 255 A. fumigatus isolates, 12 grew on the media containing azoles, indicating an azole-resistant phenotype. The Azole resistance prevalence was recorded at 4.7%, all of azole-resistant isolates exhibited azole-resistance mutations in CyP51A gene. Our finding adds to the growing list of regions where acquired resistance in A. fumigatus is documented. Our results also indicate that 4-Well microtiter plate assay is a reliable tool for azole-resistance screening and the selection of isolates that require a full panel of antifungal susceptibility testing.

PDF2: Synergistic activity, anti-adherence and antifungal abilities of flavonoids and voriconazole combined with thymol and carvacrol against C. albicans species

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Poster session 1, September 21, 2012, 12:10 PM - 1:30 PM

Objective: The current study aimed to assess the anti-adherence and antifungal activities of thymol and carvacrol against Candida albicans, C. glabrata, and C. krusei isolates obtained from patients with oral candidiasis concerning growth inhibition and fungal death as compared to the synthetic antifungals such as fluconazole and voriconazole.

Methods: The susceptibility assay for the test compounds was performed using the disk diffusion method against all Candida isolates. Also, ant-adherence activity was examined using a rapid and highly reproducible 96-well microtiter-based method.

Results: Both natural phenols and antifungal drugs revealed various efficacies against studied Candida species. The susceptibility to fluconazole and voriconazole was 100% for C. albicans, 90% and 99% for C. glabrata, and 90% and 100% for C. krusei isolates, respectively. The mean diameter of the inhibition zone was greater for fumigatus than c. albicans (19.59 ± 0.80 mm vs. 17.01 ± 0.43 mm), C. glabrata (18.87 ± 0.71 mm vs. 15.77 ± 0.57 mm), and C. krusei (18.15 ± 0.91 mm vs. 13.91 ± 0.14 mm) isolates tested.

Thymol showed more effective inhibition on adherence of all Candida species than other treatments. The mean relative adherence rates for C. albicans, C. glabrata, and C. krusei were 0.50, 0.60, and 0.64, respectively.

Conclusion: This study demonstrated significant inhibitory properties of thymol and carvacrol on the adherence and growth of azole-susceptible and -resistant Candida isolates. Also, thymol was more effective for preventing the adherence of yeast cells to polystyrene in comparison to carvacrol.