Antimicrobial peptides from the Coleoptera family Scarabaeidae against Candida and Cryptococcus pathogenic yeasts.

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Objectives: Host defense peptides (HDP) are produced by a diversity of beetles. The aims of this work were (1) to find new promising peptides from the Coleoptera family Scarabaeidae with potential biomedical applications, (2) to modify physico-chemical and structural characteristics of one of the most promising peptides in order to improve its antimicrobial properties, and (3) to evaluate its in vitro activity of the HDP against reference strains of pathogenic Candida and Cryptococcus yeasts.

Materials and Methods: From the Scarabaeidae family transcriptome, 14 promising HDPs were identified. Subsequently, we designed 19 new sequences from Acr7 peptides modifying the net charge, hydrophobic angle, and the general composition of amino acids, among other properties, in order to improve the HDPs antifungal activity. The in vitro antifungal susceptibility of the 33 HDPs against C. albicans SC5314, C. krusei ATCC 22019, C. parapsilosis ATCC 22019, C. tropicalis ATCC 750, C. neoformans 1B99, and C. gattii H99-I-2029 isolates were evaluated by broth microdilution, with a concentration ranging from 0.19 to 90 μg/mL.

Results: All 14 peptides identified showed in vitro activity against C. krusei, C. parapsilosis, and C. glabrata. One peptide showed in vitro activity against C. albicans, 6 against C. tropicalis, 11 against C. neoformans and 13 against C. gattii. As well the 19 modified peptides showed in vitro activity against C. krusei, C. parapsilosis, C. tropicalis, C. neoformans, and C. gattii. A total of 11 modified peptides showed in vitro activity against C. albicans, and 3 against C. glabrata. MIC ranges per species and per peptide are shown in Table 1.

Conclusions: The HDPs herein analyzed showed a significant in vitro antifungal activity against six Candida and two Cryptococcus pathogenic species. Our findings encourage further work with in vitro experimental models in order to better understand the action mechanisms of these antimicrobial peptides. HDPs from different species are becoming a promising therapeutic alternative in the control of fungal infections.
Objective: To determine the species distribution of dermatophytes and their antifungal susceptibility pattern for terbinafine and itraconazole in tertiary care hospital in western rajasthan

Methods: This is a prospective study conducted in the Department of Dermatology of a tertiary care hospital from December 1, 2020 to January 31, 2022.

Skin scraping, nail clipping, and hair pluckings were collected in mycology lab from clinically suspected cases of dermatophytosis. Suspected cases were subjected to KOH and calcofluor white microscopy and conventional fungal culture on SDA at 25°C and 37°C.

The cultures positive for dermatophytes were speciated by microslide culture lactophenol cotton blue mount, hair perfo-
ratation test, and slide test.

The isolates identified as Trichophyton spp were taken up for antifungal susceptibility testing against terbinafine and itraconazole by microbroth dilution according to CLSI-M38 A2 guidelines. Further antifungal resistance gene evaluation for detection of C1313A and T119C single nucleotide polymorphisms in Spadina epidemiologically Amplified Refractory Mutation System Polymorphism chain Reaction (ARMS-PCR) is underway for multiplexing.

Results: Over the 1-month study period, the laboratory processed total of 174 specimens: 134 skin scraping, 36 nail clipping, and 4 hair pluckings. Of them, 106 (61.62%) specimens were microscopy positive and 111 (63.79%) were culture positive. Out of the 141 culture-positive agents isolated, 94 (64.46%) were found to be dermatophytes. On isolates profiling of 94 dermatophytes, T. mentagrophytes was found to be most common (47.78%) followed by T. rubrum (27.27%), T. tonsurans (20.21%), T. schoenleinii 1 (0.7%), and Microsporum spp 1 (1.0%). Antifungal susceptibility of 94 Trichophyton spp against terbinafine showed resistance among 18.06% isolates with 81.31% isolates among terbinafine resistant cases showing ≥ 4 µg/ml minimum inhibitory concentration. There was no resistance detected for itraconazole with microbroth dilution.

Conclusions: A total of 194.02% skin, hair and infections were found to be caused by dermatophytes.

On isolates profiling, T. mentagrophytes, T. rubrum, and T. tonsurans were found to be predominant species among our isolates showing altered trend of local isolates from T. tonsurans being second most common spp isolated in past.

On antifungal susceptibility ≥ 5% isolates showed resistance for Terbinafine with > 90% having higher MIC of ≥ 4 µg/ml on the contrary there was no observed resistance for Itraconazole.

There is a need for encouraging dermatologists for prescribing routine fungal microscopy, culture, and AST for dermatophytes in Western Rajasthan, to reduce the indiscriminate use of antifungals.

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Initial results of an international effort in screening new agents against Candida auris

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Candida auris is an emergent fungal pathogen. A global concern regarding the yeast is its resistance to many currently available antifungal drugs, virulence factors, capacity to spread in hospital environments, and in misidentification, resulting in high rates of morbidity, and mortality.

Objectives: In response to this challenge, novel effective options of antifungals against C. auris are urgent. Therefore, our consortium evaluated the in vitro activity of two agents with novel mechanisms of actions, and negligible toxicity in in vitro and in vivo models: diphenyl disulfide (PD2) and nikkomycin Z (N7) alone and in association with conventional antifungals (azoles, echinocandins, polyenes) against C. auris.

Methods: A total of 31 isolates of C. auris were included in this in vitro study, 10 from South Asian clade I and 1 from South Africa clade III. In vitro test dilution and interaction assays were performed according to the CLSI M47-M49 protocol. Interactions between PD2 and nikkomycin Z, and amphotericin B (Amb), flucytosine (FCZ), micafungin (MCFG), or caspofungin (CSP) were evaluated by checkerboard assay, resulting in Fractional Inhibitory Concentration Indexes (FICI). Tests were read after incubation for 48 h at 37°C. The minimal inhibitory concentration (MIC) was defined as the lowest concentration