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The in Vitro and in Vivo Antifungal Activity of Terminalia Mantaly on Aspergillus Species Using Drosophila melanogaster (UAS-Diptericin) As a Model

Authors : Ponchang Apollos Wuyep, Alice Njolke Mafe, Longchi Satkat Zacheaus, Dogun Ojochogu, Dabot Ayuba Yakubu

Abstract : Fungi causes huge losses when infections occur both in plants and animals. Synthetic Antifungal drugs are mostly very expensive and highly cytotoxic when taken. This study was aimed at determining the in vitro and in vivo antifungal activities of the leaves and stem extracts of Terminalia mantaly (Umbrella tree)H. Perrier on Aspergillus species in a bid to identify potential sources of cheap starting materials for the synthesis of new drugs to address the growing antimicrobial resistance. T. mantaly leave and stem powdered plant was extracted by fractionation using the method of solvent partition co-efficient in their graded form in the order n-hexane, Ethyl acetate, methanol and distilled water and phytochemical screening of each fraction revealed the presence of alkaloids, saponins, Tannins, flavonoids, carbohydrates, steroids, anthraquinones, cardiac glycosides and terpenoids in varying degrees. The Agar well diffusion technique was used to screen for antifungal activity of the fractions on clinical isolates of Aspergillus species (Aspergillus flavus and Aspergillus fumigatus). Minimum inhibitory concentration (MIC50) of the most active extracts was determined by the broth dilution method. The fractions test indicated a high antifungal activity with zones of inhibition ranging from 6 to 26 mm and 8 to 30mm (leave fractions) and 10mm to 34mm and 14mm to36mm (stem fractions) on A. flavus and A. fumigatus respectively. All the fractions indicated antifungal activity in a dose response relationship at concentrations of 62.5mg/ml, 125mg/ml, 250mg/ml and 500mg/ml. Better antifungal efficacy was shown by the Ethyl acetate, Hexane and Methanol fractions in the in vitro as the most potent fraction with MIC ranging from 62.5 to 125mg/ml. There was no statistically significant difference (P>0.05) in the potency of the Eight fractions from leave and stem (Hexane, Ethyl acetate, methanol and distilled water, antifungal (fluconazole), which served as positive control and 10% DMSO(Dimethyl Sulfoxide)which served as negative control. In the in vivo investigations, the ingestion technique was used for the infectious studies Female Drosophilla melanogaster(UAS-Diptericin)normal flies(positive control),infected and not treated flies (negative control) and infected flies with A. fumigatus and placed on normal diet, diet containing fractions(MSM and HSM each at concentrations of 10mg/ml 20mg/ml, 30mg/ml, 40mg/ml, 50mg/ml, 60mg/ml, 70mg/ml, 80mg/ml, 90mg/ml and 100mg/ml), diet containing control drugs(fluconazole as positive control)and infected flies on normal diet(negative control), the flies were observed for fifteen(15) days. Then the total mortality of flies was recorded each day. The results of the study reveals that the flies were susceptible to infection with A. fumigatus and responded to treatment with more effectiveness at 50mg/ml, 60mg/ml and 70mg/ml for both the Methanol and Hexane stem fractions. Therefore, the Methanol and Hexane stem fractions of T. mantaly contain therapeutically useful compounds, justifying the traditional use of this plant for the treatment of fungal infections.

Keywords : Terminalia mantaly, Aspergillus fumigatus, cytotoxic, Drosophila melanogaster, antifungal
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