

BIOACTIVITY AND SAFETY OF MEDICINAL PLANTS USED IN THE MANAGEMENT OF *CANDIDIASIS* IN PADER DISTRICT, NORTHERN UGANDA

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ABSTRACT

Background: The emergence of multi-drug resistant *Candida* species has led to a renewed interest in the use of herbal medicines, as treatment option to various fungal infections globally.

Objectives: This study documented medicinal plants used for treatment of candidiasis in Pader district, assessed antifungal activities of five commonly used antifungal plants against eight susceptible and resistant strains of *Candida albicans* and non *C. albicans* species, and evaluated safety of *Khaya anthothea*, since it demonstrated the highest activity against *Candida* species.

Methods: Ethnobotanical data of potential anti-candida plants was collected using pretested questionnaires in March 2022. The Snowball method was used to select 63 herbalists. Four focus group discussions (FGDs) were used to ascertain community's perceptions on the use of anti-candida plants using interview guide. To determine the anti-candida activity of five priority medicinal plants used by the respondents in the management of candidiasis, the highest Informant Consensus Factor (FIC) was considered. The roots/ stem barks of *Sansevieria dawei*, *Momordica foetida*, *Distimake dissectus*, *Khaya anthothea* and *Mitragyna rubrostipulata* were collected, air dried and sequentially extracted using petroleum ether and methanol respectively, and total water extraction (maceration, decoction and hot water infusion). Agar well diffusion and broth micro dilution methods were respectively used to screen and verify antifungal activity of these plants on 2 *Candida* species viz; *Candida albicans* (ATCC 90028, ATCC 10231, 0796 and 0770a), and *Candida non albicans* (*C. glabrata* ATCC 2950 and VVc 004; and *C. tropicalis* ATCC 750 and 0210). Toxicity assessment of methanolic stem bark extracts of *K. anthothea* was done according to OECD guidelines 425 and 407 for acute and sub-acute toxicity evaluation respectively. Data was analyzed using SPSS 20. Ethnobotanical data was analyzed using descriptive statistic (percentages and frequency of citations). Antifungal activity of five selected medicinal plants, and the levels of toxicity of *K. anthothea* plant were ascertained using One-way ANOVA followed by Tukey's post hoc tests.

Results: Thirty-two plant species with potential anti-candida activity belonging to 18 families were identified. Families Fabaceae (9 species) and Asteraceae (5 species) dominated. Five most

cited plants were *Momordica foetida* (26), *Sansevieria dawei* (20), *Khaya anthotheca* (15), *Piliostigma thonningii* (10) and *Clerodendrum umbellatum* (7), of which, the aqueous extract at average room temperature of 24.4 °C of *M. rubrostipulata* (ZOI: 18.00±1.00 - 38.33±0.17; MIC: 3.13±0.00 - 20.83±4.17), methanol extract of *K. anthotheca* (10.11±0.31 -15.11±0.65; 1.04±0.26-12.50±0.00), and combination of aqueous extract at 60 °C of *D. dissectus* + methanol extract of *K. anthotheca* (7.89±0.26 - 19.67±0.37; 0.78±0.00- 50.00±0.00) exhibited activity against all tested *Candida* species, unlike the positive controls that cleared only some. Generally, the methanolic stem bark extract of *K. anthotheca* was safe at LD₅₀ > 5000mg/kg at acute dose. However, on long term administration of the high extract dose, there was observed toxicity in the liver, kidney and stomach.

Conclusion: Thirty two plants used by Pader communities against candidiasis were documented. The tested plant extracts generally exhibited high activity against *Candida* species under the study. Particularly the methanol extract of *K. anthotheca*, aqueous extract at 24.4 °C of *M. rubrostipulata*, and combination of aqueous extract at 60 °C of *D. dissectus* + methanol extract of *K. anthotheca* demonstrated activity against all *Candida* species tested. The most efficacious plant, *K. anthotheca* was generally safe at low the lowest dose (125mg/kg body weight) in the sub-acute toxicity test.