
EFFECT OF THE CRUDE JUICE EXTRACT OF *Gmelina arborea* ROXB. ON FOUR *Candida* spp.

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ABSTRACT

Antifungal drugs are often prescribed for patients infected with candidiasis, however the management of *Candida* infection face a number of problems including limited number of effective antifungal agents, toxicity of the antifungal agents and resistance of *Candida* to common antifungal agents. This study was carried out to determine the effect of the juice extract of *Gmelina arborea* on four species of *Candida*. The juice extract of *Gmelina arborea* was subjected to antifungal activities using agar well diffusion method to determine the various zones of inhibition, minimum inhibitory concentration (MIC) and minimum fungicidal concentration (MFC). The juice extract of this plant shows a significant sign of growth inhibition on *Candida tropicalis* and *Candida krusei* while *Candida stellatoidea* and *Candida pseudotropicalis* were resistant to the extract. The widest zone of inhibition for the extract was observed on *Candida tropicalis* with a mean value of 13.00 ± 0.00 and *Candida krusei* with a value of 11.33 ± 0.88 while there was no inhibition on *Candida stellatoidea* and *Candida pseudotropicalis*. The result of the various zones of inhibition showed that there was no significant difference between the extract and the control drug used at $P > 0.05$, this supports the use of the juice extract for the treatment of *Candidiasis* and as such they can be used for the improvement of fungicidal drugs.

Keywords: Effect, *Gmelina arborea*, *Candida* species.

INTRODUCTION

Plant materials are of wide use in traditional system of medicine in several communities of the developing world as part of available sources for the treat-

ment of various infections. In some Asian and African countries, 80% of the population nowadays depends on traditional medicine for primary healthcare and more than 100 countries have regu-

lations for herbal medicine (Togboto and Toronson, 2001; Adalakun *et al.*, 2016). Infectious diseases are the world's leading cause of premature death, killing almost 50,000 people every day. The presence of resistance genes on bacterial plasmids and transposons has played a further important role in the dissemination of drug resistance species among bacterial population (Tait, 2001; Kao *et al.*, 2016).

The accurate identification of herb is a pre-requisite for quality control and conservation procedures. The classification of plant in traditional system is based on some quality or properties of the plant, while in other instance, plants are classified on the basis of their therapeutic values. It may also take into account their odor, texture of the leaves, shape of the leaves, reaction when touched and the sensation felt on contact (Bako *et al.*, , 2002).

Gmelina arborea as a tree plant had been known not to be attacked by any fungal, viral or bacterial infection of any kind. This plant grows healthier in all environment that it is found as such gave great attention toward investigation of the active constituents responsible for such resistance (Nayak *et al.*, , 2012).

The resistance of this plant to various infection of pests and diseases had drawn the attention of the local populace towards the use of the plants in treatment of diseases such as sores, vaginal dis-

charge etc. Studies had shown that the juice extract of this plant had a high concentration of Arboreal a phenolic compound which is a major chemical constituent in the juice of the plant (Oparaeke *et al.*, 2005; Lawal *et al.*, , 2012). The purpose of this study was to investigate the effect of the crude juice extract of *G. arborea* on four species of *Candida* and to provide a base line or lay a credence for the utilization of the part of this plant for the treatment of vaginal discharge, sores, burn and other *Candida* infections

MATERIALS AND METHODS

Collection and Preparation of Plant Materials

Fresh fruit of *G. arborea* was collected from fruiting trees within the main campus of Ahmadu Bello University, Zaria. Samples were taken to the herbarium unit of the Department of Botany, Ahmadu Bello University, Zaria for proper identification, the identification number of the plant obtained was documented as 900056.

Method of Extraction

The ripped fruit samples were washed under running tap water to remove dirt's and were mashed with glass metal to separate the juice from the seeds coats and to remove the small seeds inside the fruit since it is a drupe fruit. The mixture was filtered with muslin cloth and the

juice was collected and kept in a conical flask for further analysis while the residue was discarded (Oparaeke *et al.*, 2005).

Source of Fungal Isolates

The microbes were obtained from the Department of Medical Microbiology, Ahmadu Bello University Teaching Hospital, Zaria-Nigeria. All the microbes were checked for purity and maintained in slant of nutrient Agar at room temperature.

Preparation of Standard Inoculum

The clinical isolated were culture on a Petri dish for 48 hours incubated at 30 ± 2 °C, the spores from the surface of each plates were collected with the aid of a harvesting bits and placed into a 10ml normal saline, the turbidity of the test microbes was adjusted to 0.5 Mc-Farland (CLSI, 2009).

Sensitivity Test

The clinical isolates of the microorganism were subjected to sensitivity test using Agar well Diffusion method to test the effect of the extract on the isolates (CLSI, 2014)

Determination of Minimum Inhibitory Concentration

The minimum inhibitory concentration of the extract was carried out on the microorganisms that were sensitive to

the extract and was determined using the broth dilution method (CLSI, 2014).

Determination of Minimum Fungicidal Concentrations

Minimum fungicidal concentration (MFC) was carried out principally by sub-culturing the content of the MIC in each test tube onto an already prepared PDA for observation of growth on each of the Petri dish for each concentration for each test organism. This was carried out to determine whether the test microbes were killed or their growth was only inhibited (CLSI, 2014).

RESULTS AND DISCUSSION:

The mean zone of inhibition (Table 1) of the crude juice extract of *G. arborea*, reveals that the widest mean zone of inhibition was observed on *C. tropicalis* with a mean value of 13.00 ± 0.00 while *C. krusei* has a mean value of 11.33 ± 0.88 , this could be as a result of the high concentration of Arboreal which is a phenolic compound in the juice of this plant (Evans, 2009). It conforms with the work of Marwan *et al.* (2013) where it was reported that the aqueous extract of *Zingiber officinale* and that of *Thymus kotschyana* which showed antifungal activities on the growth of *C. tropicalis* and *C. krusei*. Also a similar antifungal activity was reported by Abu-arra *et al.* (2011) of the methanolic extract of *Euphorbia hirta*

Table 1: Zone of Inhibition of the Crude Juice Extract of *Gmelina arborea* on four *Candida* spp.

Test Organism	X	Fluconazole
<i>C. tropicalis</i>	13.00 ^a ± 0.00	16.00 ^a ± 0.00
<i>C. krusei</i>	11.33 ^a ± 0.88	14.00 ^a ± 0.00
<i>C. stellatoidea</i>	0.00 ± 0.00	15.00 ^a ± 0.00
<i>C. pseudotropicalis</i>	0.00 ± 0.00	14.00 ^a ± 0.00

KEY: X = Juice extract (*Gmelina arborea*); Fluconazole = Positive control for fungi. ^aMeans with the same letter along column and row are not significantly different (p>0.05). The above values are means ± standard error of three replicates

Table 2: Minimum Inhibition Concentration of the Crude Juice Extract of *Gmelina arborea* on *Candida* spp.

Test Organisms	CONCENTRATION IN ML. V/V				
	0.1	0.05	0.025	0.0125	0.00625
<i>C. tropicalis</i>	-	-	-	0 \bar{A}	+
<i>C. krusei</i>	-	-	0 \bar{A}	+	++

KEY: - = No Turbidity (No Growth); 0 \bar{A} = MIC; + = Moderate Turbidity (Slight Growth); ++ = Turbid

Table 3: Minimum Fungicidal Concentration of the Crude Juice Extract of *Gmelina arborea* on *Candida* spp.

Test Organisms	Concentration in ML. V/V				
	0.1	0.05	0.025	0.0125	0.00625
<i>C. tropicalis</i>	-	0 \bar{A}	+	++	+++
<i>C. krusei</i>	0 \bar{A}	+	++	+++	+++

KEY: - = No Colony Growth; 0 \bar{A} = MFC; + = Scanty Colony Growth
++ = Moderate Colony Growth; +++ = High Colony Growth

on some species of *Candida*. There was no visible sign of inhibition on *C. stellatoidea* and *C. pseudotropicalis*. However, the resistance of *C. stellatoidea* and *C. pseudotropicalis* to the extract could be as a result of the mobile ability of these fungi species. It has been reported that these species of fungi were very resistant to most antibiotics and this resistance ability has been very difficult to elucidate due to the inability of these fungi species to form a stable colony (Kothavade *et al.*, 2010). All the values obtained showed that they were not significantly different from the control drug at $P > 0.05$.

The minimum inhibitory concentration of the juice extract of *G. arborea* on the two *Candida* species that were sensitive to the plant was shown as detailed in Table 2: the minimum inhibitory concentration of the juice extract on *C. tropicalis* was observed at a concentration of 0.0125ml while that of *C. krusei* was observed at 0.025ml.

The minimum fungicidal concentration (Table 4); of the juice extract on *C. tropicalis* was observed at a concentration of 0.05ml while that of *C. krusei* was not. However, at an increase concentration to about 0.1ml the growth of *C. krusei* was inhibited.

CONCLUSION

The result of this study showed that *G. arborea* juice extract possess some anti-

fungus activity on some pathogenic microorganism. This corroborates with the rationale for the use of these plant juice for the treatment of some pathogenic microorganism associated with burns, scores, vaginal discharge, boils and several other associated microbial diseases.

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