

Antifungal activity of extracts of some *Cassia*, *Detarium* and *Ziziphus* species against dermatophytes

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Received 22 August 2005; Accepted 2 July 2006

Abstract

The methanol extracts of *Cassia occidentalis* Linn., *C. singuena* (Del.) Lack, *C. tora* Linn., *Detarium microcarpum* Guill. & Perr., *Ziziphus abyssinica* (Hochst ex A. Rich) Fiori, *Z. mauritiana* Lam., *Z. mucronata* Willd. and *Z. spina-christi* Willd. found in Bauchi State, Nigeria, showed antifungal activity when tested by the agar diffusion method against dermatophytes, viz. *Trichophyton rubrum*, *T. mentagaphytes*, *Microsporum canis* and *Aspergillus fumigatus*.

Keywords: Medicinal plants, Antifungal, Microorganisms, Dermatophytes, *Cassia occidentalis*, *Cassia singuena*, *Cassia tora*, *Detarium microcarpum*, *Ziziphus abyssinica*, *Ziziphus mauritiana*, *Ziziphus mucronata*, *Ziziphus spina-christi*, *Trichophyton rubrum*, *Trichophyton mentagaphytes*, *Microsporum canis*, *Aspergillus fumigatus*.

IPC code; Int. cl.⁸ — A61K 36/00, A61K 36/48, A61K 36/482, A61K 36/725, A61P 31/10

diarrhoea, ringworm, vaginal discharge, cough, gonorrhoea and fever.

Materials and Methods

The collection of plant materials was done on the basis of their vernacular names and their botanical names were verified using a guide by Gbile¹⁰⁻¹¹ and Burkill¹².

Plant extract preparation

The freshly collected plant material was dried under shade and pulverized to fine powder. The powdered material was first defatted with hexane and then extracted with cold methanol for four days. The percentage yields of crude methanol extract are as follows: *Cassia occidentalis* (root), 5.00; *C. singuena* (root), 6.75; *C. tora* (leaves), 8.30; *Detarium microcarpum* (stem bark), 10.00; *Ziziphus abyssinica* (root), 2.50; *Z. mauritiana* (root), 4.2; *Z. mucronata* (root), 3.00; and *Z. spina-christi* (root), 4.50. The stem bark of *D. microcarpum* gave the highest yield. The plant extracts were filtered through filter paper and the filtrates were evaporated to dryness.

Antifungal screening

The microorganisms used were previously isolated from cutaneous patients in Bauchi Specialist Hospital and maintained on potato dextrose agar slants

Introduction

Herbal remedies are sought by majority of Nigerians particularly in Bauchi State. From time immemorial, plants have provided humans the essentials of life. They play a dominant role in the primary health care of about 80% of the world's population¹. Natural products and medicinal agents derived from plants are essential feature in the health care system of 20% of the population residing mainly in developed countries; with more than 50% of all drugs in clinical use have a natural product origin². In Bauchi State about 85% of the people are rural dwellers and herbal treatments are mainly first choice of defense against disease and discomfort³. Dermatophytosis, a common disorder in most countries and dermatophytic agents are well documented⁴⁻⁷. Among the

diseases caused by fungal infections; cutaneous mycoses (superficial) are the most prevalent of all⁸. There has been growing concern to combat these diseases but the available drugs have either been resistance or have devastating side effects⁹.

In the present study some plant species, viz. *Cassia occidentalis* Linn., *C. singuena* (Del.) Lack, *C. tora* Linn. and *Detarium microcarpum* Guill. & Perr. of family Caesalpiniaceae and *Ziziphus abyssinica* (Hochst ex A. Rich) Fiori, *Z. mauritiana* Lam., *Z. mucronata* Willd. and *Z. spina-christi* Willd. of family Rhamnaceae found in Bauchi State, Nigeria have been tested for potential antifungal activity by bioassay screening. These plants selected for the present study are reported to be used for the treatment of piles, dysentery,



Ziziphus spina-christi



Ziziphus mauritiana



Ziziphus mucronata



Ziziphus abyssinica



Cassia tora



Cassia occidentalis

(Difco). The antifungal test was performed by employing the method described by Yongabi⁹ with slight modification. In brief, 1g of each extract was diluted with the assay media. A uniform portion of the test fungi was removed using a 5mm steel borer and aseptically placed on to a 5mm well drilled on the assay media. Appropriate lines were drawn using a bold marker on the back of the agar plates to ease measurement of the mycelia length. All plates were carefully sealed all round with a masking tape to avoid any aerial contaminants and carefully incubated at 25°C for 5 days. The rate of mycelia growth was measured using a vernier caliper from the 6th to 11th day in mm. In this test Ketoconazole (100mg/ml) was used as experimental positive control, while water served as the negative control.

Results and Discussion

The data obtained pertaining to the antifungal potential of the extracts of the plants are presented in Table 1. The findings show that all the test fungi were inhibited significantly by all the extracts as compared to the water control. The rate of growth was slow in *Trichophyton rubrum*, while *Aspergillus fumigatus* shows high rate of growth.

It was observed that *Trichophyton rubrum* is more inhibited by all the extracts. However, *Aspergillus fumigatus* is strongly inhibited by *Detarium microcarpum* extract and less inhibited by the other extracts as seen in Table 1.

Among the *Cassia* species, *C. singuena* proved to be more potent than the others; the methanol extract of this species was also active against *Staphylococcus aureus*¹². The aqueous extracts of all these selected plants used for this study inhibited one or more opportunistic bacteria¹³.

From Table 1, it can be observed that *Cassia* spp. retarded the growth rate of the microorganisms more than *Ziziphus* spp. Ketoconazole (positive control) was more active than all the extracts. Earlier, similar effects of Ketoconazole used as positive control and showing it strong inhibition compared to the extracts were also reported¹⁴. The media containing water (negative control) indicates high growth rate compared to all the extracts.

Table 1: Effect of methanol extracts on the growth rate of *Trichophyton rubrum*, *Trichophyton mentagraphytes*, *Aspergillus fumigatus* and *Microsporium canis* (in mm)

Plant name (part used)	<i>Trichophyton rubrum</i>		<i>Trichophyton mentagraphytes</i>		<i>Aspergillus fumigatus</i>		<i>Microsporium canis</i>	
	6 th day	11 th day	6 th day	11 th day	6 th day	11 th day	6 th day	11 th day
<i>Cassia occidentalis</i> (root)	0.90	2.00	1.10	4.35	12.50	15.35	8.60	10.85
<i>C. singuena</i> (root)	0.60	1.10	0.76	2.95	9.10	10.85	6.00	8.65
<i>C. tora</i> (leaves)	0.80	1.50	1.20	4.90	10.00	12.00	7.80	10.00
<i>Detarium microcarpum</i> (stem bark)	0.55	0.90	0.70	1.95	4.00	10.50	8.20	10.70
<i>Ziziphus abyssinica</i> (root)	7.00	10.50	6.00	11.50	13.00	15.25	10.60	13.55
<i>Z. mauritiana</i> (root)	3.00	5.00	5.50	9.15	12.00	14.00	9.10	11.35
<i>Z. mucronata</i> (root)	1.50	4.00	5.40	9.45	12.50	14.45	10.35	11.95
<i>Z. spina-christi</i> (root)	1.00	2.15	5.00	8.45	11.50	13.35	7.35	10.70
Ketoconazole (+ve control)	0.35	0.61	0.15	1.55	5.00	6.35	4.45	5.95
Water (-ve control)	16.40	21.00	12.00	17.00	20.50	24.85	15.00	19.00

Conclusion

The results demonstrate that antifungal activity of these plants against dermatophytes correlates well with the claims of traditional uses for skin infections. Since some of these plants appeared to have broad spectrum of activity and are cheap, they could be useful in antiseptic or disinfectant formulations. However, further studies are needed including *in vivo* investigations and toxicity evaluation. Purification and identification of the active components from some of these plants are in progress.

Acknowledgements

We are grateful to the Research Grant Committee of Abubakar Tafawa Balewa University, Bauchi for financial support. We also thank Mr. K.A. Yongabi of Biological Sciences Programme, Abubakar Tafawa Balewa University for laboratory assistance.

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