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Antifungal Activities of the Leaf Extract of *Cassia tora* Linn. (Fam. Leguminosae)

Pulok K. Mukherjee, Kakali Saha, B. P. Saha and M. Pal*

Department of Pharmaceutical Technology, Faculty of Engineering and Technology, Jadavpur University, Calcutta – 700 032, India

J. Das

Department of Pharmacology, Dr. B. C. Roy P. G. Institute of Basic Medical Sciences, University College of Medicine, University of Calcutta, Calcutta-700 020, India

The antifungal activity of the dealcoholized extract of leaves of *Cassia tora* Linn. was determined on five different fungal organisms. The crude leaf extract significantly inhibited the growth of *C. albicans, A. niger, S. cerevisiae* and *T. mentagophytes* when tested by turbidity and spore germination methods in a concentration dependent fashion. The effects produced by the extract were compared with a standard antifungal agent griseofulvin.

Keywords: Cassia tora; antifungal activity; *C. albicans; A. niger; S. cerevisiae; T. mentagophytes.*

INTRODUCTION

Cassia tora Linn. (Family Leguminosae), commonly known as 'Chakunda' in Bengali and as 'Chakramarda' or 'Prabunatha' in Sanskrit is a well-known herb in India (Duthie, 1960). In the Ayurvedic system of medicine *C. tora* has a great reputation in all kinds of skin diseases (Nadkarni, 1985; Chatterjee and Pakrashi, 1992). The leaves are gently aperient. Both leaves and seeds constitute a valuable remedy in skin diseases, chiefly for ringworm and itch (Kirtikar and Baus, 1975). The leaves, when applied on cuts, act like tincture of iodine and are useful against eczema (Asolkar *et al.*, 1992). The leaf juice of other species of Cassia like *C. alata, C. occidentalis* and *C. sophera* are known to be effective against ringworm (Uphof, 1959). 1,6,8,trihydroxy-3-methyl anthraquinone (emodin) has been isolated from the leaves (Pal *et al.*, 1977). The toxicity of the crude extract has been studied in mice (Pal *et al.*, 1977).

In anticipation of its reputation in skin diseases the efficacy of the dealcoholized extract of leaves of *Cassia tora* Linn. was determined on five different fungal organisms.

* Author to whom correspondence should be addressed.

MATERIALS AND METHODS

Plant material. The leaves of *Cassia tora* were collected from local area. Taxonomic identification was established by the Botanical Survey of India, Shibpur, Howrah. The leaves were dried, powdered and stored in a well-closed container for further use.

Preparation of leaf extract. 150 g of powdered leaves were moistened for 24 h with 800 mL of 90% (v/v) methanol. The mixture was then filtered and the filtrate was dried under vacuum on a water bath at 60°C to constant weight. A stock solution contianing 300 μg/mL of this dealcoholized extract was made with sterile water containing propylene glycol. A solution of griseofulvin (1000 p.p.m.) prepared by dissolving in propylene glycol and diluted with water was used as a standard.

Media used. Solid agar and liquid culture media 'C' and 'D' as specified in the Indian Pharmacopoeia (1985) was used for turbidity and spore germination methods.

Cultures. Pure cultures of the fungal organsisms, *C. albicans* ATCC 10231, *A. niger* ATCC 16404, *S. cerevisiae* ATCC 9763 and *T. mentagophytes* ATCC 9533 were procured from Central Drugs Laboratory, Calcutta, India.

Table 1. Antifungal activity of *C. tora* leaf extract by spore germination method

	Spore germination inhibition (%)			
Treatment	*C. albicans* ATCC 10231	*A. niger* ATCC 16404	*S. cerevisiae* ATCC 9763	*T. mentagophytes* ATCC 9533
Extract (μg/mL)				
100	78.23±10.5[a]	68.68±10.5[a]	67.3±8.8[a]	68.40±9.4[a]
200	87.52±9.4[a]	74.10±8.7[a]	72.15±9.2[a]	73.90±9.8[a]
300	95.30±11.2[a]	89.40±11.1[a]	88.20±9.3[a]	88.50±9.7[a]
Griseofulvin (1000 μg/mL)	96.70±8.9[a]	86.82±11.6[a]	83.95±9.6[a]	87.55±10.5[a]
Control	0.0	0.0	0.0	0.0

[a] $P<0.001$ comparing with control by Student's *t*-test ($n=10$).

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Table 2. Inhibitory responses of *Cassia tora* extract on various fungal organisms (turbidity method)

Test organism	Control	Griseofulvin (1000 p.p.m.)	Extract 100 μg/mL	200 μg/mL	300 μg/mL	Activity (%) of extract (300 μg/mL) with respect to griseofulvin
C. alibans ATCC 10231	2.82±0.15	1.05±0.16[a]	2.05±0.2[b]	1.85±0.15[a]	1.55±0.23[a]	67.74±1.8
A. niger ATCC 16404	2.85±0.08	1.20±0.12[a]	2.34±0.21[b]	2.12±0.14[a]	1.88±0.15[a]	63.83±2.1
S. cerevisiae	2.80±0.12	1.31±0.15[a]	2.48±0.18[c]	2.23±0.15[b]	2.10±0.11[a]	62.38±1.9
T. mentagophytes	2.79±0.21	1.40±0.13[a]	2.63±0.17[c]	2.42±0.12[b]	2.36±0.09[b]	63.13±1.6

[a] $p<0.001$, [b] $p<0.001$, [c] $p<0.05$ comparing with control by Student's *t*-test ($n=10$).

Turbidity method. This was performed by tube dilution technique (Pelczar *et al.*, 1993). A series of test tubes (16×125 mm), containing sterile culture medium and various concentrations of extract 100, 200 and 300 μg/mL, griseofulvin (1000 p.p.m.) and one control (ten tubes for each) were taken. All tubes were inoculated with fungal organisms to be tested and then incubated at 20°–25°C for 48 h. Turbidity produced was measured thereafter against a blank (Anonymous, 1985).

Spore germination method. For assaying the antifungal activity of the extract by this method spore suspensions of 7 days old were prepared with the test compound. A drop of spore suspension was placed on a sterilized slide and incubated in a humid chamber for 12 h and the number of spores germinated scored to calculate the percentage of spore germination by the following formula (Surender *et al.*, 1987).

% of spore germination inhibition =

$$100 - \frac{\%\text{ spore germination in treated}}{\%\text{ spore germination in control}} \times 100$$

RESULTS AND DISCUSSION

The extract at concentrations of 100, 200 and 300 μg/mL showed the widest spectrum of activity against all the organisms being tested in spore germination (Table 1) and turbidity (Table 2) tests. The growth inhibitory responses of the extract at concentrations of 100, 200 and 300 μg/mL were obtained by the turbidity and spore germination method by comparing with that of griseofulvin (1000 p.p.m.), a standard antifungal agent. The extract (300 μg/mL) was 67.74%, 63.83%, 62.38% and 63.13% active with respect to griseofulvin when tested against *C. albicans*, *A. niger*, *S. cerevisiae* and *T. mentagophytes* respectively as shown by the turbidity method (Table 2). The extract showed significant inhibitory responses against all the organisms tested in the order of *C. albicans* > *A. niger* > *A. mentagophytes* > *S. cerevisiae*, in a concentration dependent fashion in both spore germination and turbidity tests.

From the above observation it can be suggested that the dealcoholized extract of the leaves of *Cassia tora* is an effective antifungal agent when tested *in vitro*. This provides some evidence for the leaves being used in treating various skin diseases.

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