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## Anti fungal efficacy of *cassia fistula* used in Indian herbal medicine

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### Abstract

The present study was undertaken to study the anti fungal activity of *Cassia fistula*. All the cultures are human pathogenic and were procured from Primer Biotech Research Centre, Hyderabad. The micro organisms selected for the present study are *Candida albicans* and *Aspergillus niger*. The present study indicated the anti fungal activity of methanol leaf extracts of the *Cassia fistula*. The present study confirms the extracts of selected medicinal plants can be employed as anti fungal agents in formulation of the novel drugs. Further it necessitates the pharmacological evaluation.

**Keywords:** *Cassia fistula*, anti fungal, *Candida albicans*, *Aspergillus niger* and Itraconazole

### Introduction

Ayurveda, Siddha and Homoeopathy are part of Indian traditional system of medicine. The great sages like Dhanvanthari, Charaka, and Susrutha practiced the traditional medicine and it spread across the globe from India. Traditional system of medicine is the therapeutic method in most of the developing countries for the maintenance of health. Most of the population *i.e* almost more than 80% of the population of third-world countries relied on traditional system of medicine according to WHO (Vines, 2004) [1]. Tropical forests are more diverse and sources of many plant derived medicines. Plants are used directly or indirectly either in folk medicine or in pharmaceutical preparations (Savithamma *et al.* 2007) [2]. Plants are used in medicinal preparations (Upadhyay *et al.*, 2007) [3]. Age, weight of the patient and the severity of the disease are the criteria in treating the diseases by plant derived medicine. There is a need to develop new anti fungal agents as some of the fungi developed resistance towards existing drugs. Several authors documented some anti fungal agents (Kumar *et al.*, 2001) [4]. Fungal infections are one of the causative factors for morbidity and mortality (CSIR; 1998) [5].

Mucosal and skin infections are of great concern as they pose a serious health problem especially in third world countries (Portillo, 2001) [6]. In recent past prevalence of fungal infections were increased manifold and only a very few anti fungal agents are available for chemotherapy and therefore there is a need for search of new anti fungal agents. Especially there is an increasing tendency of fungal infections in HIV-AIDS patients and who are under prolonged treatment plans (Giordani, 2001) [7]. Recently many black fungus resistant cases were reported during Covid-19 surge. Poor sanitation, unhygienic conditions, lack of potable drinking water and many more are among the factors for the higher prevalence of fungal infections.

Secondary metabolites secreted by plants as part of the metabolism are being exploited as sources of medicinal compounds (Lis-Balchin and Deans, 1997) [8]. Plants have been explored for drugs for the therapeutic use, additives in food, agrochemicals and industrial chemicals and others (Charu *et al.*, 2012, Habila *et al.*, 2011) [9, 10]. Certain commensal fungi, such as *Candida* species, cause infections when their human hosts become immune-compromised.

Plant derived drugs are safe to human and the ecosystem than the chemical antifungal compounds, and can be easily be used by the public. Many studies have been carried out to screen medicinal plants for their antifungal activity.

Survey of literature reveals numerous reports on *vitro* and *in vivo* efficacy of plant derived compounds against plant and human pathogenic fungal infections (Natarajan *et al.*, 2003) [11]. Singh (1994) [12] studied the antifungal activity of *Mentha spicata*. Angioni *et al.* (2004) [13] documented the chemical composition, plant genetic differences, antimicrobial and antifungal activity of *Rosmarinus officinalis*. Mimica-Dukic (2003) [14] reported essential oil composition and antifungal activity of *Foeniculum vulgare* Mill.

Pai MB (2010) [15] reported antifungal efficacy of *Punica granatum*, *Acacia nilotica*, *Cuminum cyminum* and *Foeniculum vulgare* on *Candida albicans*. Kumar (2001) [16] revealed the chemical composition, antifungal and anti-aflatoxigenic activities of *Ocimum sanctum* L. Balakumar *et al.* (2011) [17] studied the antifungal activity of *Ocimum sanctum* Linn.

## Materials and Methods

### Collection of plant material

The selected plant *Cassia fistula*, Linn. (Fabaceae) is popularly known as as “golden shower.” To obtain the crude extract, leaves were collected from different parts of Karimnagar district and processed for anti fungal studies.

### Fungal Cultures Used

All the fungal cultures selected for the present study were procured from Primer Biotech Research Centre, Hyderabad. *Candida albicans* and *Aspergillus niger* were selected for the present investigation to know the anti fungal activity. Two days before the testing, the culture is prepared by inoculating the fungus from master culture into Potato Dextrose Agar (PDA) medium and incubated for 48 hours at room temperature.

The standards Itraconazole were used as standards for antifungal studies. All the test compounds (controls) were tested at 250 µg/mL. All the plant leaf extracts of methanol were tested at 25 µg/mL, 50µg/mL, 75 µg/mL, 100 µg/mL. Paper disk of 6 mm diameter and 2mm thickness was used for the test. These disks were sterilized by autoclaving at 121 °C (15 lbs psi) for 15 minutes.

### Preparation of Leaf extracts

The leaves of were dried under shade and made to a fine powder. The powder (100 grams) were extracted with methanol and dried for 3 hours. Culture media provides all essential nutrients for the growth of microorganism. PDA (Potassium-dextrose agar) medium was used and nutrient media prepared was sterilized by autoclave at 121 °C for 20 mins at 15 lbs pressure.

### Procedure

Petri dishes were filled up to of 3-4 mm with a nutrient agar medium. This poured medium was allowed to set and then inoculated with susceptible test organism culture using cotton swab under aseptic conditions under laminar air flow unit. Each plate was divided into four equal portions along the diameter. Each portion was used to place one disk. Four disks of each sample were placed on four portions using sterilized forceps.

The petri dishes were incubated at 28 °C for 4 days. Diameter of the zone of inhibition was measured. The diameter obtained for the test samples were compared with that produced by standards.

Several studies conformed the *Candida albicans* and *Aspergillus niger* are resistant fungi, the present findings confirmed the anti fungal nature of the plant extracts and the methanol leaf extract of *Cassia fistula* are effective.

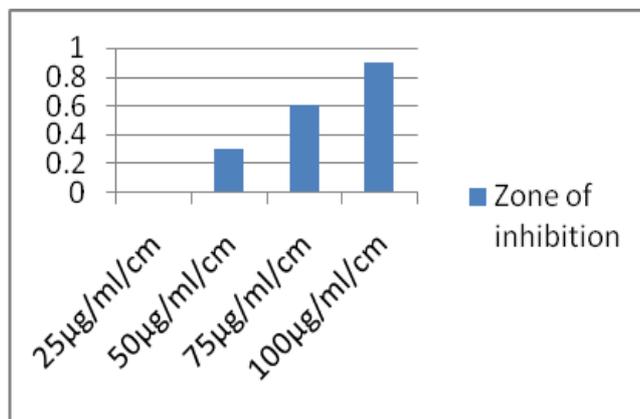
## Results and Discussion

The anti fungal activity of *Cassia fistula* was presented in table no's 1, 2 and histograms 1 and 2 respectively for *C. albicans* and *A. niger*. The anti fungal activity of *Cassia fistula* against *C. albicans* was 0.3 cm which is minimum at 50 100µg/ml/cm and 0.9 cm *i.e* highest in the present study at

the concentration of 100µg/ml/cm. The anti fungal activity of *Cassia fistula* against *A. niger* was 0.2 cm which is minimum at 50 µg/ml/and at 100µg/ml/cm it was 0.8 cm *i.e* highest in the present study.

**Table 1:** Zone of inhibition of anti-fungal activity of *Cassia fistula* against *C. albicans*.

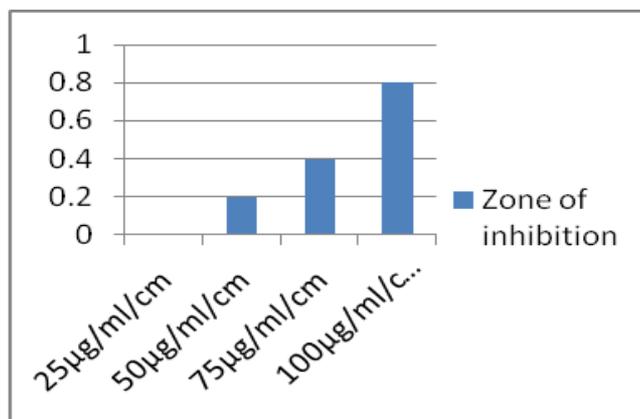
Concentration	Zone of inhibition
25µg/ml/cm	0
50µg/ml/cm	0.3
75µg/ml/cm	0.6
100µg/ml/cm	0.9



**Fig 1:** Zone of inhibition of anti-fungal activity of *Cassia fistula* against *C. albicans*

**Table 2:** Zone of inhibition of anti-fungal activity of *Cassia fistula* against *A. niger*

Concentration	Zone of inhibition
25µg/ml/cm	0
50µg/ml/cm	0.2
75µg/ml/cm	0.4
100µg/ml/cm	0.8



**Fig 2:** Zone of inhibition of anti-fungal activity of *Cassia fistula* against *A. niger*.

The present findings are similar to other studies on *Candida albicans* and *Aspergillus niger* (Uniyal *et al.*, 2006, Bhadauria and Kumar, 2011) [18, 19]. The findings of the present study validate the leaf extracts of *Cassia fistula*. The present study confirms the extracts of selected medicinal plants can be employed as anti fungal agents in formulation of the novel drugs. Further it necessitates the pharmacological evaluation.

## Conclusion

The bio active nature of the present selected medicinal plants may be due to the presence of Flavonoids, alkaloids, tannins,

and phenolic compounds. The purified components may possess more activity rather than the crude extract. The degree of varying sensitivity of fungi may be due to the intrinsic tolerance and the nature and type of phytochemicals present in the crude extract.

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