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IN VITRO EVALUATION OF ANTI MYCOTIC ACTIVITY OF ETHANOLIC FRUIT EXTRACT OF *GARCINIA MANGOSTANA* LINN

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ABSTRACT

The aim of the present study was to assess the anti fungal activity of ethanolic fruit extract of *Garcinia mangostana*. Mangosteen commonly known as “Queen of fruits” have been traditionally used by natural health providers for thousands of years. It is a potent medicinal plant in the traditional Indian medicinal systems. Ethanolic fruit extract of *Garcinia mangostana* was tested for antifungal activity against *Candida albicans*, *Aspergillus niger*, *Aspergillus fumigates*, *Aspergillus flavus* and *Mucor spp.* Agar well diffusion technique was followed for screening anti fungal activity. The wells were loaded with 50µl of ethanolic extracts at different concentrations [125 ug, 250 ug and 500 ug]. Positive controls used were fluconazole (10 mcg /disc) and amphotericin B (100 units /disc). After incubation at 28° C for 48 hours, the zone of inhibition was measured. The extract at different concentrations showed varying degree of antifungal activity against the micro organism compared to standard.

Keywords: *Garcinia mangostana*, Antimycotic evaluation, Agar well diffusion, Mac Farland's standard, Zone of inhibition.

INTRODUCTION

Garcinia mangostana, colloquially known simply as mangosteen, is a tropical evergreen tree believed to have originated in the Sunda Islands and the Moluccas of Indonesia. The pleasant taste (sweet and slightly acidic) and medicinal qualities of the reddish purple mangosteen fruit have led to its common name as “Queen of Fruits”. The tree grows from 7 to 25 m tall. Its trunk is erect with dark-brown bark, which contains the yellow, gummy, bitter latex. Leaves are thick, leathery, dark-green, slight glossy above, yellowish green

and dull beneath with conspicuous pale midrib. The flower is unisexual and dioecious. However, male tree is extremely rare and the female trees have infertile staminoles. The male flowers are in clusters of 3 – 9 at the branch tips. The female flowers are borne singly or in pairs at the tip of young branchlets. The fruit is round, purple in color and has a smooth, thick and tough pericarp. The pericarp contains bitter yellow latex and purple staining juice. The fruit has a prominent calyx at the stem end and 4 – 8 triangular, flat stigma lobes which always corresponds to the number of fleshy segments of the fruit. The fruit contains 4 – 8 triangle segments of white, juicy and soft flesh. The fruit may be seedless or having 1 to 5 fully

developed seeds. The flesh is slightly acidic and adhered to the seeds.

Numerous studies have shown that mangosteen has high concentrations of xanthenes, a class of polyphenolic compounds. Researches have identified a total of over 40 Xanthenes from the hull, rind and the pulp of Mangosteen fruits.⁵⁻⁷ Xanthenes have, antibacterial,^{8,9} antifungal,¹⁰ antioxidant,¹¹ antitumor,^{12,13} anti-inflammatory,^{14,15} antiplatelet aggregation, antithrombotic, and vasorelaxant activities, prevent oxidative damage of low-density lipoprotein, histamine, and serotonin receptor blocker activity, and inhibit HIV. The xanthenes and tannins of the mangosteen pericarp protect against insects, fungi, plant viruses, bacteria and animals while the fruit is still immature. Of the 200 known xanthenes, nearly 40 are found in mangosteen. The major xanthenes are alpha-mangostin, beta-mangostin, gamma-mangostin, and methoxy-beta-mangostin, and the most abundant is alpha-mangostin.^{16,17} Calcium, phosphorus, iron, thiamine, riboflavin, niacin, and ascorbic acid are found in mangosteen.

Modern day science has recently begun to appreciate the incredible, nutrient-rich value of mangosteen and its wide-reaching, health-promoting properties. Hence, the aim of our study was to evaluate the Antimycotic activity of ethanolic fruit extract of *Garcinia mangostana* Linn.

MATERIALS AND METHODS

Plant materials:

The ethanolic fruit extract of *Garcinia mangostana* Linn was obtained from Green Chem Herbal Extract & Formulations, Bangalore.

Test microorganisms

Fungal strains used were *Candida albicans*, *Aspergillus fumigates*,

Aspergillus niger, *Aspergillus flavus* and *Mucor* sps. The organisms were obtained from Department of Microbiology, Saveetha Medical College and maintained in SDA slope at 4°C.

METHODOLOGY

The extracts were prepared in the following concentrations in sterile water. 2.5 mg/ml, 5 mg/ml and 10 mg/ml, so that 50µl of extract of different concentrations delivers 125µg, 250µg and 500 µg respectively.

Anti mycotic Assay

Agar well Diffusion Technique:

The extract at different concentrations was screened for their antifungal activity against the selected fungal strains by Agar well diffusion method. The fungal cultures were grown on Sabourauds destrose agar [Hi media M063]. The fungal growth from seven day old culture was washed, suspended in normal saline and then filtered through glass wool aseptically. The colony forming units (CFU/ml) of suspension of the fungus was determined and test inoculum was adjusted to 0.5 Mc Farland's standard and used for antifungal assay.¹⁸⁻²¹ 100µl of the test inoculum were applied on the surface of the Sabourauds destrose agar plate and spread using sterile glass spreader. Wells were cut on the agar plates using sterile cork borer for different concentration of the extracts. 50µl of extract of different concentrations were loaded in to the wells and incubated for 48 h at 28°C. As a positive control, fluconazole (10 mcg /disc) and amphotericin B (100 units /disc) were used. Zone of inhibition in mm were determined after 48 h. The test was performed in triplicate to minimize test error.

RESULTS AND DISCUSSION

Effect of three different concentrations (500, 250 and 125 µg) of ethanolic fruit extract of *Garcinia mangostana* was tested against the fungal strains using agar well diffusion technique. All the concentrations of the extract inhibited the fungal species with varying degree of sensitivity. The antifungal activity of the extract against the fungal strains is shown in Table 1. The extract showed good antifungal activity against the three *Aspergillus* Spp, *Aspergillus niger* *Aspergillus fumigatus* and

Aspergillus favus at all concentrations with a maximum zone of inhibition of 20mm , 22mm and 19mm diameter respectively at conc 500ug. With *Candida albicans* and *Mucor spp* highest concentration [500µg] showed inhibitory zone of 17 mm and 12 mm diameter respectively.

From the results, it was evident that the lower concentration showed very weak activity while the higher concentration of the extract showed good antifungal activity against all the fungal strains tested.

Table 1: Antifungal Activity of the Ethanolic fruit extract of *Garcinia mangostana* Linn

Extract	conc. (µg)	Zone of inhibition* (diameter-mm)				
		B1	B2	B3	B4	B5
Ethanolic	125	9	10	11	9	7
	250	11	14	15	14	8
	500	17	20	22	19	12
fluconazole (10 mcg/disc)		24	22	22	20	22
amphoteracin B (100 units/disc)		22	20	24	19	21

B1= *Candida albicans* B2= *Aspergillus niger* B3= *Aspergillus fumigatus*

B4= *Aspergillus favus* B5= *Mucor spp*

*Each value represents the mean of three determinants

Fungal infections or mycosis are more common today than ever before .They represent the invasion of tissues by one or more species of fungi. It may range from superficial, localized skin conditions to deeper tissue infections to serious systemic diseases. Some fungi are opportunistic while others are pathogenic, causing disease whether the immune system is healthy or not. The incidence of fungal infections has increased at an alarming rate in the past two decades. Most of this increase is due to opportunistic fungal infections related to the growing population of people with weakened immune systems due to HIV, cancer, and other diseases; and

to modern medical practices such as the use of intensive chemotherapy and drugs that suppress the immune system.

Due to resistance to anti fungal agents, it makes necessary to discover new classes of antifungal compounds to treat fungal infections. Antifungal herbs have been used as an alternative medicine since thousands of years ago to relieve itchiness and irritation which has been clinically researched and approved to be of great help. Plants are rich source of bioactive secondary metabolites of wide variety such as tannins, terpenoids, alkaloids, and flavonoids, reported to have in vitro antifungal properties. A series of molecules

with antifungal activity against different strains of fungus have been found in plants, which are of great importance. The results obtained from our study shows that ethanolic extract has got a very good anti mycotic activity against the selected fungal species.

CONCLUSION

The results of present investigation clearly indicate the antifungal activity of ethanolic fruit extract of *Garcinia mangostana* Linn and that could be used as a sources for the isolation of active compounds that may serve as lead compounds in antifungal drug development. Further studies on their cytotoxicity or toxicity will be beneficial in providing data on the possible harmful effects of this extract. Thus, the study ascertains the value of plants used in ayurveda, which could be of considerable interest to the development of new drugs.

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