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Original Research Article

Amla possesses antifungal potential against *Alternaria alternata, Bipolaris specifera* and *Curvuleria lunata*

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ABSTRACT

Introduction: The present study was carried out to evaluate antifungal activity of methanolic extract from Emblica officinalis leaves against three phytopathogens viz., Alternaria alternate, Bipolaris specifera and Curvuleria lunata.
Materials and Methods: Inhibitory potential of methanolic extract was analyzed by poisoned food technique in which different concentrations of test material were prepared in sterilized potato dextrose agar.
Results: Results of the present study revealed that Embilica officinalis has potential activity against the three test pathogens with IC_{50} value of 0.91±0.01 mg/mL, 1±0.015 mg/mL and 1.1±0.0152 mg/mL against Bipolaris specifera, Alternaria alternata and Curvuleria lunata respectively.
Conclusion: Amla has some potential antifungal activity for the prevention and treatment of fungal infections.

1. Introduction

Emblica officinalis known as Indian gooseberry or *amla,* belongs to family Euphorbiaceae, is a medium-sized deciduous tree with gray bark and reddish wood. It is native to tropical southern Asia and possesses very highly characteristic medicinal value. *E. officinalis* plant extracts revealed antibacterial / antifungal [1], antioxidant [2] and cardio-protective [3] properties. *E. officinalis* is highly nutritious and is one of the richest sources of vitamin-C, amino acids and minerals. [4] It contains several chemical constituents like tannins, alkaloids and phenols. [5] Pharmacological research reports on amla reveals its analgesic [6], cardio [7], gastro [8], nephron [9] and anticancer [10] properties. In view of the above, the present research was carried out to evaluate the antifungal activity of *E. officinalis.*

2. Materials and Methods

Preparation of extracts: Fresh leaves of amla were collected from Herbal Garden, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu (SKUAST-J). The freshly collected leaved were chopped, shade dried and ground into powdered form. The powdered dried material was then extracted with methanol at room temperature to obtain extracts for bioevaluation.

2.1. Determination of antifungal activity of E .officinalis extracts by poisoned food technique

Different concentrations of test component (extract) were prepared in sterilized potato dextrose agar and poured in 9 cm petri plates. After this, 5 mm bit of test fungus was

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Table 1: Growth inhibitory effect of Emblica officinalis leaves on fungal strains.

Extract	Conc. (mg/mL)	Phytopathogenic fungi		
		Alternaria alternata	Curvuleria lunata	Bipolaris specifera
		Growth Inhibition (%)		
Methanolic	0.5	37.5	37.5	42.5
	1	51.2	47.5	51.0
	2	68.5	66.25	70
	IC_{50}	1±0.015	1.1 ±0.0152	0.91±0.01
	Conc. (μg/mL)		Growth Inhibition (%)	
Amphotericin (positive control)	10	48.5	46.20	50.75
	20	65.00	61.00	71.50
	40	83.60	81.60	85.69
	IC_{50}	9.5±0.1	12.1±0.4	5.7±0.2

Maximum growth inhibition by test material as indicated by IC_{50} value.

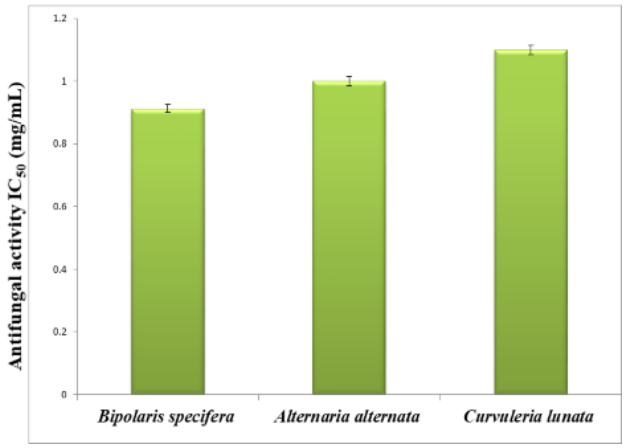

Fig. 1: Antifungal IC_{50}(mg/mL).

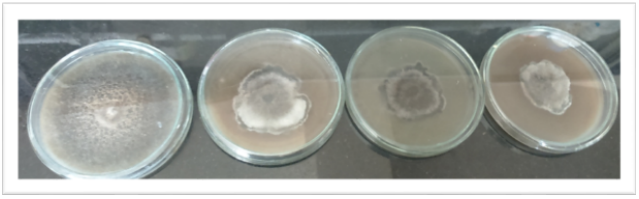

Fig. 2: Antifungal activity against *Bipolaris specifera.*

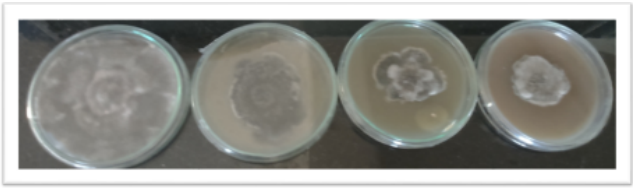

Fig. 3: Antifungal activity against *Alternaria alternate.*

inoculated in the center of the agar plate (mycelia surface of the bit was placed upside down) followed by incubation of petri plates at 26 ^{0}C. The extension diameter (mm) of hyphae from the center to the dish was measured at 24 h interval, till the growth of fungus in the plate without test component (control) reached the edge of the plates. The experiment was repeated thrice and results were expressed as average of three replicates.[11]

Fungal growth diameter in each plate containing concentrations of test component was determined to calculate per cent growth inhibition.

The antifungal indices was calculated as:

2.2. Antifungal index (%) = (1-D_a/D_b) ×100

1. D_a = Diameter of growth zone in the experiment dish (mm).
2. D_b = Diameter of growth zone in the control (mm).

3. Results and Discussion

Exploitation of antifungal activity of amla leaves revealed that methanolic extract of amla inhibited the growth of the colonies of large number of fungal species. The antimicrobial efficacy of extract of amla was qualitatively assessed on the basis of inhibition zone. To evaluate the antifungal activity of methanolic extract from *amla* leaves, three important phytopathogenic fungi, *Bipolaris specifera, Alternaria alternata* and *Curvuleria lunata* were selected. The results of the present study showed that the antifungal activity of amla against three test pathogens with IC_{50} values were 0.91±0.01 mg/mL, 1±0.015 and 1.1±0.0152 mg/ml respectively (Table 1). The antimicrobial components produced by plants are active against plant pathogens. However, their use is increasingly restricted due to the harmful effects of pesticides on human health and the environment. The use of biological compounds extracted from plants may be an alternative to conventionally used fungicides to control phytopathogenic fungi. The search for antimicrobials from natural sources has received much

attention and efforts have been put in to identify compounds that can act as suitable antimicrobials agent to replace synthetic ones. Phytochemicals derived from plant products serve as a prototype to develop less toxic and more effective medicines in controlling the growth of micro-organism.[12] These compounds have significant therapeutic application against human pathogens including bacteria, fungi or virus. Numerous studies have been conducted with the extracts of various plants, screening antimicrobial activity as well as for the discovery of new antimicrobial compounds.[13] Therefore, medicinal plants are finding their way into pharmaceuticals, neutraceuticals and food supplements. Further, research has to be conducted to find out the possibility of this medicinally important plant as a potent antimicrobial drug and for other pharmacological properties to develop as cost effective formulation.

4. Source of Funding

None.

5. Conflict of Interest

None.

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