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Journal of Chemical and Pharmaceutical Research

J. Chem. Pharm. Res., 2010, 2(1): 121-124

ISSN No: 0975-7384

Evaluation of antimicrobial efficacy of some medicinal plants

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Abstract

Medicinal plants are finding use as pharmaceuticals, nutraceuticals, cosmetics and food supplements. Even as traditional source of medicines and they continue to play pivotal rule. Ethanolic extract of three medicinal plants *viz.*, *Acalypha indica*, *Ricinus communis* and *Euphorbia hirta* were evaluated for there therapeutic potential as antimicrobial agent against six standard organisms 3 bacteria *(Klebsiela pneumoniae, Salmonella typhi, Pseudomonas aeruginosa*) and 3 fungi (*Aspergillus flavus, Fusarium oxysporium, Penicillium chrysogenum*) by using Filter Paper Disc Method. Antimicrobial efficacy of callus cultures of *E. hirta* with inhibition zone of 16 mm was found to highest against *F. oxysporium* (Fungus) and in *A. indica* with inhibition zone of 27 mm was found to maximum against *K. pneumoniae* (Bacteria). Contrary, in *in vivo* analysis of antimicrobial efficacy of *A. indica* with inhibition zone of 15 mm were found to highest against *P. chrysogenum* (Fungus) and *E. hirta* with inhibition zone of 25 mm was found to highest against *K. pneumoniae* (Bacteria).

Keywords: *Acalypha indica, Ricinus communis, Euphorbia hirta,* antimicrobial activity, inhibition zone.

Introduction

Traditional uses of plants have led to investigating their bioactive compounds through screening programs, which have resulted in the detection of a significant number of therapeutic properties. The search for plants with antimicrobial activity has gained increasing importance in recent

years, due to a growing worldwide concern about the alarming increase in the rate of infection by antibiotic-resistant microorganisms or multi-resistant microbes. Numerous studies have been conducted with the extracts of various plants, screening antimicrobial activity as well as for the discovery of new, antimicrobial compounds [1-3]. Plants are used medicinally in different countries and are a source of many potent and powerful drugs [4-7]. The interest in the scientific investigation of *A. indica, R. communis* and *E. hirta* is based on the claims of its effective use for the treatment of many diseases.

The present paper deals with the *in vitro* and *in vivo* screening of Indian medicinal plants for antimicrobial activity. Therefore, this research regarding the antimicrobial activity of these plants is expected to enhance the use of *A. indica, R. communis* and *E. hirta*, diseases caused by the test pathogens. The pathogenic organisms were selected for the study on the basis of their clinical, pharmaceutical importance as well as for their potential to cause contamination of food and drugs.

Materials and Methods

Plant material

Plant material used for this study was collected in September to October from University Botanical Garden, Botany Department, University of Rajasthan, Jaipur, India.

Preparation of plant extract:

50 gm. powder of each plant material (aerial plant parts and calli) were percolated with 250 ml of 80% ethanol with the help of soxhlet and the resultant residue were evaporated to dryness to yield residue, which is further used to perform antimicrobial assay.

Test Microorganism

Pure culture of all the bacteria, namely *Pseudomonas aeruginosa, Salmonella typhi, Klebsiela pneumoniae* were obtained through the courtesy of SMS medical college, Jaipur, India, while the test fungi namely *Fusarium oxysporum, Aspergillus flavus, Penicillium chysogenum* were obtained from the Seed Pathology Laboratory, Department of Botany, University of Rajasthan, Jaipur, India. which are maintained on Nutrient Broth and Potato Dextrose Agar (PDA) respectively.

Antimicrobial assay:

Antimicrobial activity of the extracts was tested by using “Filter Paper Disc Method” [8].

Results and Discussion

Many possible sources of extraction and synthesis of antibiotics have been elaboratively worked out, but search for better, safer and an economic source is always necessitated. In this context attempt has been made towards the screening of various crude extract to identify their antimicrobial activity by knowing the activation index. Many plants or plant parts have been studied for their antimicrobial potential [9-10]. In the present investigation ethanolic extract of the leaves of *A. indica, R. communis* and *E. hirta* were screened for its antimicrobial activity.

Table 1. Anti-microbial activities of crude ethanolic extract of *A. indica*, *R. communis* and *E. hirta*

Microorganisms	*A. indica*		*R. communis*		*E. hirta*	
	***In vivo* (IZ)**	***In vitro* (IZ)**	***In vivo* (IZ)**	***In vitro* (IZ)**	***In vivo* (IZ)**	***In vitro* (IZ)**
Fungus						
A. flavus	10	13	12	10	7	8
F. oxysporum	10	14	11	9	12	16
P. chrysogenum	15	8	11	13	10	12
Bacteria						
K. pneumoniae	20	25	18	_	25	27
S. typhi	8	9	10	20	_	8
P. aeruginosa	_	27	15	_	_	19

IZ = Inhibition Zone in mm; **(-)** = No activity

Table-1 indicates the antimicrobial efficacy of callus cultures of *E. hirta* with inhibition zone of 16 mm was found to highest against *F. oxysporium* (Fungus) and in *A. indica* with inhibition zone of 27 mm was found to maximum against *K. pneumoniae* (Bacteria).

Contradictory, in *in vivo* analysis of antimicrobial efficacy of *A. indica* with inhibition zone of 15 mm were found to highest against *P. chrysogenum* (Fungus) and *E. hirta* with inhibition zone of 25 mm was found to highest against *K. pneumoniae* (Bacteria).

The ethanolic extract generally exhibits a high degree of antimicrobial efficacy and this seems to confirm the traditional therapeutic claims of these herbs [11]. The most promising plants are those for which the extract exhibited a marked activity or significant activity. These results suggest the presence of either good antibacterial potency or of the high concentration of an active principle in the extract. This antimicrobial activity would support the folk therapy of infections whose symptoms might involve fungi and bacteria. The results obtained indicated the existence of antimicrobial compounds in the crude ethanolic extracts of *A. indica*, *R. communis*, *E. hirta* and this shows that the ethanolic extract of these has a broad spectrum of microbial inhibition.
This study is a preliminary evaluation of antimicrobial efficiency of the plants. It indicates that several plants have the potential to generate novel metabolites. The crude extracts demonstrating antimicrobial activity could result in the discovery of novel antimicrobial agents. The plants demonstrating broad spectra of activity may help to discover new chemical classes of antibiotics that could serve as selective agents for the maintenance of animal or human health and provide biochemical tools for the study of infectious diseases.

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