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EVALUATION OF ANTIMICROBIAL ACTIVITY OF SOME MEDICINAL PLANTS IN BANGLADESH.

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A B S T R A C T

Ethanolic extract of three medicinal plants namely Ocimumtenniflorum,CentellaasiaticaandEuphorbia hirtawere evaluated fortheirtherapeutic potential as antimicrobial agent against sixstandard organisms three bacteria and threefungi,using paper disc method. The antimicrobial effectiveness of callus cultures of E. hirtawithinhibition zone of 18 mm was found highest against C.gramineum and in O.tenniflorumwith inhibition zone of 28 mm was found highest against K. pneumonia.On the Contrary, in in vivo analysis of antimicrobial efficacy of O.tenniflorumwith an inhibition zone of 16 mm was found to the highest against P. chrysogenum andE. hirtawith an inhibition zone of 24 mm was found to the highest against K. pneumonia.

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1. Introduction

Medicinal plants have been used since ancient times to treat illness. Plants used as raw materials in herbal medicine are called medicinal plants (Mohammed 2019). The U.S. Forest Service estimates that 40% of pharmaceutical drugs used in the Western world are derived from plants (Medical Botany 2023). Seven thousand medical compounds are derived from plants in the modern pharmacopeia. Herbal medicine combines traditional empirical knowledge with modern science(Mohammed 2019). A medicinal plant is considered an important source of prevention against various diseases (Mohammed 2019). The essential medicine component is extracted from different parts of the plants.(Kumar *et al*., 2017). In underdeveloped countries, people use medicinal plants as a substitute for medicines. There are different species of plants around the world. Herbs are one of them, which have different shapes, colors, and leaves (Wu *et al.*, 2007).

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 have taken on increasing importance in recent years, due to growing global concern over the alarming increase in the rate of infection with antibiotic-resistant microorganisms or multi-resistant microbes. Many studies have been conducted with extracts from various plants, testing antimicrobial activity as well as for the discovery of new antimicrobial compounds (Dygeraket al., 2002, Ibrahim et al., 2002, Bassam et al., 2006). Plants are used medicinally in different countries and are a source of many potent and powerful drugs (Sasidharanet al., 1998, Semraet al., 2006, Suffrediniet al., 2006, Kubmarawa et al., 2007). Interest in scientific investigation of O. tenniflorum, C. asiaticaand E. hirtais based on claims of its effective use for the treatment of many diseases.

The present paper discusses in vitro and in vivo screening of medicinal plants of Bangladesh for their antimicrobial activity. Therefore, this research regarding the antimicrobial activity of these plants is expected to enhance the use of O.tenniflorum, C.asiaticaandE. hirta, diseases caused by the test against the pathogens. Pathogenic organisms were selected for study based on their clinical and pharmaceutical importance

as well as for their potential to cause contamination of food and drugs.

2. Materials and Methods

2.1. Plant material

Plant materials were collected from Rajshahi university campus Rajshahi, Bangladesh.

2.2. Preparation of plant extract

Fifty gm. powder of each plant material (aerial part of the plant and callus) was percolated with 250 ml of 80% ethanol many soxhlet and the resulting residue was evaporated to dryness to give a residue, which was then used to perform antimicrobial assay.

2.3. Test Microorganism

Pure culture of all the bacteria, namely K.pneumoniae, S.dysenteriae, E.coli,were obtained courtesy of the Department of Microbiology, GonoBishwabidyalay, Savar, Dhaka, Bangladesh, while the fungi tested namely A. niger, C. gramineum, P. chrysogenumwere obtained University of Rajshahi, Rajshahi, Bangladeshby the kind permission of the Department of Botany , which were preserved on nutrient broth and potato dextrose agar (PDA) respectively.

2.4. Antimicrobial assay

Antimicrobial activity of the extracts was tested using the filter paper disc method" (Gould *et al.*, 1952).

3. Resultsand Discussion

Many possible sources of antibiotic extraction and synthesis of antibiotics have been extensively developed,but the search for a better, safer, and more economic source is still necessary. In this context, attempts have been made to sort various crude extract to identify theirantimicrobial potential. In the present investigation ethanolic extract of O.tenniflorum, C.asiaticaandE. hirtawere screened for antimicrobial activity.

Table 1. Anti-microbial activities of crude ethanolic extract of *O. tenniflorum, C. asiatica*and *E. hirta*

Plant extract tested	Test method	Zone of inhibition (in mm) agsainst test organisms					
		Fungi			Bacteria		
		A. niger	*C. gramineum*	*P.chrysogenum*	*K.pneumoniae*	*S.dysenteriae*	*E. coli*
O.tenniflorum	In vivo	10	10	16	20	8	21
	In vitro	13	14	8	25	9	25
C.asiatica	In vivo	12	11	11	18	10	15
	In vitro	10	9	13	23	20	21
E.hirta	In vivo	7	12	10	24	6	15
	In vitro	8	18	12	28	8	19

The table indicates that the antimicrobial effectiveness of callus cultures of *E. hirta*with inhibition zone of18 mm was found highest against *C.gramineum* and in *O.tenniflorum*with inhibitionzone of 28 mm was found maximum against *K. pneumoniae*.On the contrary, the*in vivo* analysis of antimicrobial efficacy of *O.tenniflorum*with a16 mm inhibition zone was found to be higher against *P.chrysogenum* and*E. hirta*with a 24 mm inhibition zone was found to be higher against *K.pneumoniae*.The ethanolic extract generally exhibits a high degree of antimicrobial effectiveness, which appears to support the traditional therapeutic claims of these herbs (Dwivedi *et al.,* 1998). The most promising plants are those for which the extract should marked or significant activity. These results suggest the presence of either a good antibacterial potency or a high concentration of active ingredient in the extract. This antimicrobial activity would support the traditional therapy for infections whose symptoms might involve fungi and bacteria. The results obtained indicated the existence of antimicrobial compounds in the crude ethanolic extracts of *O.tenniflorum, C.asiatica, E. hirta*and this shows that the ethanolic extract of these exhibits a broad spectrum of microbial inhibition.

4. Conclusions

This study is a preliminary assessment of antimicrobial activity of the plants. It indicates thatseveral plants have the potential to generate novel metabolites. Crude extracts demonstratingantimicrobial activity could lead to the discovery of novel antimicrobial agents. Plantsdemonstrating abroad spectrum of activity could helpdiscover new chemical classes of antibioticsthat could serve as selective agents for the maintenaning animal or human health and providebiochemical tools for the study of infectious diseases.

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