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Comparative Studies on Antimicrobial Activity of *Artemisia Sieversiana* Ehrhart. Ex. Willd. and *Origanum vulgare* L.

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ABSTRACT: The present study was carried out to evaluate the antimicrobial potential of *Artemisia sieversiana* Ehrhart. Ex. Willd. (Asteraceae) and *Origanum vulgare* L. (Lamiaceae) from their extracts. Solvent ether, petroleum ether, chloroform, acetone, ethanol, benzene and aqueous extracts were tested against the test organisms viz., Bacterial strains (*Escherichia coli* and *Bacillus subtilis*) and fungal strains (*Mucor hiematis* and *Aspergillus flavus*). Ethanol extract of *A. sieversiana* had maximum zone of inhibition against *E. coli*. Whereas, chloroform extract of *A. sieversiana* showed maximum zone of inhibition against *B. subtilis*. The ethanol extracts of *O. vulgare* had maximum inhibition zone against *E. coli* and *B. subtilis*. Chloroform extract of *A. sieversiana* showed highest zone of inhibition against *Mucor hiematis* The *O. vulgare* extracts had no much activity against *Mucor hiematis* and *A. flavus*. Aqueous extracts of both the plants at different concentration showed no inhibition on the tested organisms due to loss of some active compounds during extraction processes of the sample.
KEY WORDS: antibacterial activity, antifungal activity, plant extracts, *Artemisia sieversiana*, *Origanum vulgare.*

INTRODUCTION

Plants have been the traditional source of raw materials for medicines. The use of medicinal plants for the treatment of several diseases is a primary health care in India[1]. The potential of higher plants as a source of new drugs is still largely unexplored. The trend of using natural products has increased and the active plant extracts are frequently screened for new drug discoveries and for the presence of antimicrobials[2].

Researchers have shown that all different parts of the plants which include stem, root, flower, bark, leaf, etc., possess antimicrobial property[3]. Many active compounds such as alkaloids, flavonoids, tannins, saponins, essential oils, etc., are present in these plant parts which are responsible for antimicrobial activity. Many plant species have been evaluated for their antimicrobial activity in the past 20 years[4]. And since then efficacy of many medicinal plants in the treatment of many diseases have been put to test in many laboratories[5]. Screening of antimicrobial plants for new agents possesses an enormous challenge and is important especially with the emergence of drug resistant pathogenic strains.

The main aim of the present investigation is to study the comparative studies on antimicrobial activity of *Artemisia sieversiana* Ehrhart. Ex. Willd. (Asteraceae) and *Origanum vulgare* L. (Lamiaceae). Both the plants possess anthelmintic, emmenagogue, antibiotic and analgesic properties. Besides *A. sieversiana* is being used in traditional oriental medicines to relieve symptoms of rheumatic arthritis[6]. *O. vulgare* has been used in whooping cough and

bronchitis and also applied externally for healing wounds[7].

MATERIALS AND METHODS

COLLECTION AND IDENTIFICATION OF PLANT MATERIALS

The whole plant of both *A. sieversiana* and *O. vulgare* were collected in 2008 from Anaimalai Hills, Western Ghats, Tamilnadu, India. The plants were identified using various books[8,9] and voucher specimens from Botanical Survey of India (BSI), Bharathiyar University and Kongunadu college Herbarium collection center.

PREPARATION OF EXTRACTS

The whole plants were washed thoroughly under running tap water and 70% alcohol to free them from dust and other contaminated particles. The plants were shade dried, powdered and extracted (50g) successesively with, solvent ether, petroleum ether, chloroform, acetone, ethanol and benzene at different concentrations in a soxhlet unit for 20 hrs. The crude extracts were evaporated to dryness at 37°C to remove excess solvent.

The aqueous extract was prepared by soaking 50g of powder with 200ml of distilled water. After 24 hrs elapsed with internal stirring, the mixture was filtered using What's man No.1 filter paper and the filtrate was left for dryness by evaporation using steam bath at 100°C. These crude extracts were used for bioassay against Gram negative, Gram positive bacterium and pathogenic fungi.

TEST ORGANISMS

Bacterial strains (*Escherichia coli* and *Bacillus subtilis*) and fungal strains (*Mucor hiematis* and *Aspergillus flavus*) were obtained from KG Hospital, Coimbatore. The bacterial strains were maintained in nutrient agar slants and fungal strains in potato dextrose agar slants and stored at 4°C.

ANTIMICROBIAL ASSAY

The disc diffusion method[10] was followed for the antimicrobial assay. Inoculums were prepared from the 24 hours old culture of bacterial isolates in nutrient broth and from the 48 hours culture of fungal isolates in potato dextrose broth. Nutrient agar plates were prepared and the inocula were seeded by spread plate method, for the fungal isolates. Potato dextrose agar was prepared and the mycelia plugs were put at the center of the prepared extracts. The extracts were applied to sterile What'sman No. 1 filter paper discs (6mm) and placed on the seeded plates. After 24 hrs. of 37°C and 48 hrs. of 25°C for bacterial and fungal inoculation respectively. The inhibition zone surrounding the discs by the diffusion of compounds was measured in mm diameter. The solvents were used as negative control to determine their effects on test organisms. Whereas, ciprofloxacin antibiotic discs were used as positive control to compare the effectiveness of the extracts against test organisms.

RESULTS

All the plant extracts used in this study possessed antimicrobial activity except the aqueous extracts of both plants. The results were presented in the table 1. Ethanol extract of *A. sieversiana* had maximum zone of inhibition against *E. coli* (15mm) at 100mg/ml whereas chloroform extract of *A. sieversiana* showed maximum zone of inhibition against *B. subtilis* (9mm) at 100mg/ml. when compared with *O. vulgare* solvent ether and ethanol extracts had maximum inhibition zone against *E. coli* (10mm) at 100mg/ml and sovent ether extract of *O. vulgare* had maximum inhibition zone against *B. subtilis* (10mm) at 100mg/ml. *A. sieversiana* had low activity against *B. subtilis* in all concentrations. Whereas benzene extract of *O. vulgare* had no activity against *E. coli* and very low activity against *B. subtilis*.

Chloroform extract of *A. sieversiana* showed highest zone of inhibition against *Mucor hiematis* (11mm) at 100mg/ml. whereas petroleum ether, acetone, ethanol and benzene extracts of *A. sieversiana* had no inhibition zone against *A. flavus*. The highest zone was noted in chloroform extract (8mm) at 50mg/ml. The *O. vulgare* extracts had no much activity against *Mucor hiematis* The highest zone was noted in ethanol extract (10mm) at 50mg/ml. even they had no activity against *A. flavus*. The zone of inhibition was very low 7mm at 25mg/ml of chloroform extract and 100mg/ml ethanol extract. Standard ciprofloxacin (positive control) showed 20mm, 15mm, 16mm and 13mm zone of inhibition against *E. coli*, *B. subtilis, M. hiematis* and *A. flavus* respectively.

DISCUSSION

The results showed that all the extracts of *A. sieversiana* and *O. vulgare* possessed antimicrobial activity except their aqueous extract. Similar result was obtained while studying the antimicrobial activity of *Bacopa monnieri*[11]. Disc diffusion method was used to evaluate the zone of inhibition against the test organisms. Disc diffusion method is used extensively to investigate the antimicrobial activity of natural substances and plant extracts. These assays are based on the use of discs as reservoir containing solutions of the substances to be examined[12].

Antimicrobial activity from plant source can be assumed to be useful. On the other hand ethanolic and chloroform extracts exhibited an elevated

antimicrobial activity against all test organisms. Usually the plant extracts produce anti- infective agent, which could be active against human pathogens[13]. As evident from the results the antimicrobial activity of the extracts against test organisms and these findings correlate with the observation of various screening of medicinal plants for antimicrobial activity[14-17].

While screening the medicinal plants for antimicrobial activity, they showed much activity against bacterial strains. Aqueous extracts of both the plant species at different concentration showed no inhibition on the tested organisms due to loss of some active compounds during extraction processes of the sample. Further studies on the activity for the isolation of respective pure compounds result in interesting results.

Table 1: Antimicrobial activity of *Artemisia sieversiana* Ehrhart. Ex. Willd. and *Origanum vulgare* L.

Sl. no	Name of the solvents	concentration	*Artemisia sieversiana*				*Origanum vulgare*				DMSO control
			E. coli	*B. subtilis*	*Mucor hiematis*	*A.flavus*	*E. coli*	*B. subtilis*	*Mucor hiematis*	*A.flavus*	
1	Solvent ether	50	10	-	7	-	7	9	7	-	-
		100	11	8	8	7	10	10	8	-	-
2	Petroleum ether	50	8	8	-	-	-	-	8	-	-
		100	7	-	7	-	-	8	-	-	-
3	Chloroform	50	9	-	8	8	8	-	8	-	-
		100	10	9	11	7	9	9	9	-	-
4	Acetone	50	-	9	-	-	8	8	-	-	-
		100	10	-	7	-	7	7	-	-	-
5	Ethanol	50	10	-	9	-	9	7	10	-	-
		100	15	8	7	-	10	8	8	7	-
6	Benzene	50	9	-	7	-	-	-	-	-	-
		100	8	8	9	-	-	8	8	-	-
7	Aqueous	50	-	-	-	-	-	-	-	-	-
		100	-	-	-	-	-	-	-	-	-

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