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ANTIMICROBIAL ACTIVITIES OF EXTRACTS OF SOME PLANTS

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Abstract

In this study, the antimicrobial activity of *Myricaria germanica* (L.) Desv., *Centaurium erythraea* Rafn subsp. *turcicum* (Velen.) Melderis, *Prunella vulgaris* L., *Pelargonium endlicherianum* Fenzl., *Chrysophthalmum montanum* (DC) Boiss. and *Jurinea ancyrensis* Bornm., were investigated. The antimicrobial activity were evaluated according to the disk diffusion method by using *Bacillus megaterium* DMS 32, *Pseudomonas aeruginosa* DMS 50071 SCOTTA, *Escherichia coli* ATCC 25922, *Klebsiella pneumoniae* FMC 5, *Proteus vulgaris* FMC 1, *Staphylococcus aureus* COWAN 1 FMC 16, *Candida albicans* FMC 17, *Candida glabrata* ATCC 66032 and *Candida tropicalis* ATCC 13803

In the end of experimental studies, the extracts of six plants used in this study were inhibited the growth of microorganisms used in the test at different ration. The results indicated that *Chryosphtalum montanum* had the greatest antimicrobal activity.

Introduction

Plant, as sources of medicinal compounds have continued to play a dominant role in the mainlenance of human health since ancient times. The World Health Organization estimates that plant extracts or their active constituens are used as folk medicine in tradional therapies of 80% of the worlds population (Anon., 1993). Over 50% of all modern clinical drugs are of natural product orgin (Baker *et al*., 1995). Turkish pepople have a tradition of using a number of plant species for the treatment of infectious diseases and various ailments (Baytop, 1984).

The effect of plant extracts on microorganism have been studied by a very large number of researchers in different parts of the world (Kıvçak *et al*., 2002; Uzun *et al*., 2002; Ateş *et al*. 2003; Kırbag *et al*., 2005; Şengül, *et al*., 2005; Mahansen, 1996; Naır, 2005; Dülger, 2005; Kumar *et al*., 2006; Mathabe *et al*., 2006).

An infusion of the dried leaves of *Myricaria germanica* are used as analgesic. An infusion of the dried leaves of *Centaurium erythraea* subsp. *turcicum* are extensively used as digestive disorder, analgesic and fresh leaves are used as vulnerary. An infusion of the dried leaves of *Prunella vulgaris* are used as carminative, indigestion and vulnerary. A decoction of the dried leaves of *Pelargonium endlicherianum* are used as intestinal disorder. Decoction of dried leaves *Jurinea ancyrensis* is used to settle stomach and to reduce fever. Pulveres of the dried leaves of *Chrysophthalmum montanum* are extensively used in sinusitis with nasal insufflation.

The aim of the present study was to evalute the antimicrobial activity of above plants.

Materials and Methods

Materials: *Myricaria germanica*, *Centaurium erythraea* subsp. *turcicum*, *Prunella vulgaris*, *Pelargonium endlicherianum*, *Chrysophthalmum montanum* and *Jurinea ancyrensis* were collected from Elazığ, in Turkey and identified according to the relevant literature (Davis 1965-1985).

Test microorganisms: Six bacteria viz., *Bacillus megaterium* DMS 32, *Pseudomonas aeruginosa* DMS 50071 SCOTTA, *Escherichia coli* ATCC 25922, *Klebsiella pneumoniae* FMC 5, *Proteus vulgaris* FMC 1, *Staphylococcus aureus* COWAN 1 FMC 16, and as yeasts viz., *Candida albicans* FMC 17, *Candida glabrata* ATCC 66032 and *Candida tropicalis* ATCC 13803 were used as test organisms. Microorganism were provided by Firat University, Department of Biology, Microbiology Laboratory Culture Collection.

Extract preparation: The dried and powdered plant materials 10 gr. were extracted in 150 ml solvent by kept on a rotary shaker for 24 h. Then, it was filtered through Whatman No. 1 filter paper. The sample were further concentrated to dryness under reduced pressure at 37ºC using a rotary evapotor. It was dissolved in dimethyl sulfoxid and stored at 4ºC for further studies. All the extracts thus obtained was injected into empty sterilized antibiotic disc having a diameter of 6 mm in the amount of 20 µl (Schleicher&Shüll No: 2668, Germany). The controls which only 20 µl of solvents were injected to the disc. Streptomysin sülfat and Nystatin were used as standard.

Preparation of microbial cultures: The bacterial strains were inoculated into nutrient broth and yeast strain inoculated in to malt extract broth for 24 and 48 h. respectivelly. In the disc-diffusion method, sterile Mueller Hinton agar for bacteria and Malt extract agar for yeast were separately inoculated with the test bacteria and yeasts 10^5 bacteria per/ml, 10^4 yeast per /ml). Disc were applied on the solid agar medium by pressing slighthly. Petri dishes were placed at 4ºC for 2 h. and then incubated at 35±0.1ºC for 24 h and yeast incubated at 25±0,1 for 3 day. At the and of the period, inhibition zones were measured in millimeters (Collins *et al*., 1989).

Results and Discussion

In vitro antimicrobial activities of extracts of six plant and standard antibiotic is show in Table. 1.

The extracts of plants showed various antimicrobial activities against the microorganism. *P. vulgaris*, *C. montanum*, *J. ancyrensis* showed antimicrobal activity against all microorganism. Of the plants studied, the most active extract were those obtaind from *C. montanum*, *J. ancyrensis*. The extract of *C. montanum* have the highest antimicrobial effeciency (inhibition zone between 14 and 22 mm).

The extract of *M. germanica* did not show any activity against *P. aeruginosa*, *E. coli*, *P. vulgaris*, *S. aureus*, *C. albicans* while antimicrobial activity was observed against *B.megaterium*, *K. pneumoniae*, *C. glabrata*, *C. tropicalis* (inhibition zone between 8- 18 mm).

The antimicrobial activity of *C. erythraea* was observed to be very low. The extract of this inhibitory effect was 13 mm against *B. megaterium*, 8 mm against *K. pneumoniae*, 8 mm against *P. vulgaris*, but showed no inhibition zone against the other microorganisms. *P. vulgaris* inhibited the growth of all the test microorganisms with inhibition zone between 8 and 15 mm diameter.

The extract *P. endlicherianum* was observed against *B. megaterium*. *E. coli*, *K. pneumoniae*, *P. vulgaris*, *C. albicans*, *C. tropicalis* while antimicrobial effect was not shown against *P. aeruginosa*, *S. aureus*, *C. glabrata*. *J. ancyrensis* showed activity against all microorganism, with diameters of inhibition zone ranging between 11 and 21 mm. All microorganism were inhibited by *C. montanum* (inhibition zone 14- 22 mm). The growth of *B. megaterium* and *K. pneumoniae* inhibited by the whole extracts used in the study. Inhibition zone ranging from 8 and 22 mm was formed. *C. montanum* showed the highest activity against *S. aureus* (22 mm). Control disc did not show any activity against microorganism. Standard disc inhibited the growth of all the test microorganisms.

Table 1. Antimicrobial activity of some plants extracts.

Materials	***M. g***	***C. e***	***P. v***	***P. e***	***C. m***	***J. a***	**Control**	**Standard**
Microorganisms	**Inhibition Zone (mm)**							
B. megaterium	8	13	10	8	14	11	-	9**
P. aeruginosa	-	-	11	-	18	11	-	11**
E. coli	-	-	8	8	18	14	-	13**
K. pneumoniae	8	8	-	15	22	14	-	9**
P. vulgaris	-	7	11	8	20	18	-	11**
S. aureus	-	-	11	-	18	15	-	13**
C. albicans	-	-	11	11	20	20	-	18*
C. glabrata	8	-	13	-	18	17	-	12*
C. tropicalis	18	-	15	18	18	17	-	11*

M.g: *Myricaria germanica*, C.e: *Centaurium erythraea,* P.v: *Prunella vulgaris,* P.e: *Pelargonium endlicherianum*, C. r:: *Chrysophthalmum montanum*, J. a: *Jurinea ancyrensis* , (-): No inhibiton zone
*: Nystatin, **: Streptomysin sülfat

These results show that there are differences in the antimicrobial effect of plant groups, due to phyto chemicial differences among species. Çetin & colleaques (1989) claimed that sensivity of microorganism to chemoterapeutic compounds change even against different strains. In similar studies, the extracts of different plants inhibited the growth of some microorganisms at different ration.

It would suggst that all plant extracts, especially *C. montanum* and *J. ancyrensis* can be used as antimicrobal agents in development of new drugs for the treatment of infectious disease.

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