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 antimicrobial activity.

Introduction

Plant, as sources of medicinal compounds have continued to play a dominant role in the mainenance 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; Kirbag et al., 2005; Şengül, et al., 2005; Mahansen, 1996; Nair, 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 evaluate 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. Microorganisms 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 evaporator. 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. respectively. 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 10⁵ bacteria per/ml, 10⁴ yeast per /ml). Disc were applied on the solid agar medium by pressing slightly. 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 end 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 antimicrobial 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.

<table>
<thead>
<tr>
<th>Materials</th>
<th>M. g</th>
<th>C. e</th>
<th>P. v</th>
<th>P. e</th>
<th>C. m</th>
<th>J. a</th>
<th>Control</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>B. megaterium</em></td>
<td>8</td>
<td>13</td>
<td>10</td>
<td>8</td>
<td>14</td>
<td>11</td>
<td>-</td>
<td>9**</td>
</tr>
<tr>
<td><em>P. aeruginosa</em></td>
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<td>11</td>
<td>-</td>
<td>18</td>
<td>11</td>
<td>-</td>
<td>11**</td>
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<tr>
<td><em>E. coli</em></td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>8</td>
<td>18</td>
<td>14</td>
<td>-</td>
<td>13**</td>
</tr>
<tr>
<td><em>K. pneumoniae</em></td>
<td>8</td>
<td>8</td>
<td>-</td>
<td>15</td>
<td>22</td>
<td>14</td>
<td>-</td>
<td>9**</td>
</tr>
<tr>
<td><em>P. vulgaris</em></td>
<td>-</td>
<td>7</td>
<td>11</td>
<td>8</td>
<td>20</td>
<td>18</td>
<td>-</td>
<td>11**</td>
</tr>
<tr>
<td><em>S. aureus</em></td>
<td>-</td>
<td>-</td>
<td>11</td>
<td>-</td>
<td>18</td>
<td>15</td>
<td>-</td>
<td>13**</td>
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<tr>
<td><em>C. albicans</em></td>
<td>-</td>
<td>-</td>
<td>11</td>
<td>11</td>
<td>20</td>
<td>20</td>
<td>-</td>
<td>18*</td>
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<tr>
<td><em>C. glabrata</em></td>
<td>8</td>
<td>-</td>
<td>13</td>
<td>-</td>
<td>18</td>
<td>17</td>
<td>-</td>
<td>12*</td>
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<tr>
<td><em>C. tropicalis</em></td>
<td>18</td>
<td>-</td>
<td>15</td>
<td>18</td>
<td>18</td>
<td>17</td>
<td>-</td>
<td>11*</td>
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</table>


*: Nystatin, **: Streptomycin sulphate

These results show that there are differences in the antimicrobial effect of plant groups, due to phytochemical differences among species. Çetin & colleagues (1989) claimed that sensitivity of microorganism to chemotherapeutic 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 suggest that all plant extracts, especially *C. montanum* and *J. ancyrensis* can be used as antimicrobial agents in development of new drugs for the treatment of infectious disease.

### References


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