

## Antibacterial Activity of *Centaurea* Species Having Ethnobotanical Features

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**Abstract:** The antimicrobial activity of the ethyl acetate, acetone, chloroform and ethanol extracts from *Centaurea pseudoscabiosa* Boiss. and Buhse ssp. *glechnii* (Trautv.) Wagenitz, *C. spicata* Boiss., *Centaurea glastifolia* L., *Centaurea salonitana* Vis., *Centaurea balsamita* Lam. and *Centaurea behen* L. species (*Asteraceae*) investigated by agar disc diffusion and MIC method.

**Key words:** Antibacterial activity, *Centaurea* sp., ethnobotany

### INTRODUCTION

**Plant:** Six *Centaurea* taxa of Turkey were collected from original localities in 2003. *Centaurea pseudoscabiosa* ssp. *glechnii* (Trautv.) from Van-Baskale, *C. spicata* Boiss. from Hatay-Dortyol, *C. glastifolia* L. were collected from Kahramanmaraş-Göksun, *C. salonitana* Vis. were collected from Canakkale-Central town, *C. balsamita* Lam. were collected from Van-Central town and *C. behen* L. were collected from Hakkari-Yuksekov. The voucher specimens were deposited in the Herbarium of Faculty of Science and Arts, Canakkale Onsekiz Mart University.

**Uses in traditional medicine:** Many species of the genus *Centaurea* L. (*Asteraceae*) have traditionally been used for the treatment of various ailments<sup>[1]</sup>. The genus *Centaurea* L. has been the subject of many antimicrobial activity studies<sup>[2-7]</sup>. *C. behen* has traditionally been used for stomach treatment and to menstruate<sup>[8]</sup>. *C. salonitana* has traditionally been used for tumor treatment<sup>[9]</sup>. *C. pseudoscabiosa* ssp. *glechnii* is well known for its traditional use as skin ailments and rappahannock. *C. glastifolia* is well known for its traditional use as appetizer. However, it is interesting to note that many other species, like *C. salonitana* and *C. behen*, which have traditionally been used to treat tumor and aphrodisiac, were found to be active at test bacteria in this study.

**Previously isolated classes of constituents:** Not report.

**Tested material:** The plants were air dried and aerial parts (stem, leaf, flower and fruit) were grinded and 20 g of

grinded samples were extracted with 150 mL of ethyl acetate, acetone, chloroform, alcohol solvent (Merck, Darmstadt) for 24 h by using Soxhlet equipment.

**Studied activity:** Antibacterial activity was studied by disc diffusion method<sup>[10,11]</sup> and the Minimum Inhibitory Concentration (MIC) was determined by Broth dilution method<sup>[12]</sup>.

**Used microorganisms:** Total 10 bacteria species mostly recorded in hospital infection were used in this study. *Escherichia coli* (ATCC 25922), *Staphylococcus aureus* (ATCC 25923), *Streptococcus pneumoniae* (ATCC 49616), *Pseudomonas aeruginosa* (ATCC 27853), *Staphylococcus epidermidis* (ATCC 12228), *Enterococcus faecalis* (ATCC 29212), *Klebsiella pneumoniae* (ATCC 13883), *Proteus mirabilis* (ATCC 7002), *Bacillus cereus* (ATCC 11778) and *Enterobacter aerogenes* (ATCC 13043).

### RESULTS AND DISCUSSION

The ethyl acetate and acetone extracts of *C. pseudoscabiosa* ssp. *glechnii*, ethyl acetate and chloroform extracts of *C. spicata* and ethyl acetate and ethanol extracts of *C. glastifolia* showed some degree of activity against some bacteria. Ethanol extract of *C. glastifolia* showed significant antimicrobial activity against only *S. epidermidis* and *P. mirabilis*. Ethanol of *C. glastifolia* showed a inhibition zone very close to standard antibiotic ciprofloxacin. The ethyl acetate and acetone extracts of *C. salonitana*, ethyl acetate and ethanol extracts of *C. balsamita* and *C. behen* showed some degree of activity against some bacteria. The ethyl acetate extract of *C. behen* showed significant

Table 1: Antibacterial activity of six *Centaurea* species extracts against to tested the bacterial strains based on agar disc diffusion method (zone of inhibition, IZ, mm) and microdilution assay (MIC,  $\mu\text{g mL}^{-1}$ )

Microorganism	Inhibition zone in diameter (mm/sensitive strains)																								Standard antibiotic
	<i>C. pseudoscabiosa</i> ssp. <i>glechnii</i> (C, D not active)				<i>C. spicata</i> (B, D not active)				<i>C. glastifolia</i> (E, C not active)				<i>C. salonitana</i> (C, D not active)				<i>C. balsamita</i> (B, C not active)				<i>C. behen</i> (B, C not active)				
	A		B		A		C		A		D		A		B		A		D		A		D		
	IZ	MIC	IZ	MIC	IZ	MIC	IZ	MIC	IZ	MIC	IZ	MIC	IZ	MIC	IZ	MIC	IZ	MIC	IZ	MIC	IZ	MIC	IZ	MIC	
<i>E. coli</i>	18	0.9	10	15.6	0	0.0	10	15.6	0	0.0	16	1.9	12	7.8	8	31.2	15	1.9	11	15.6	0	0.0	15	1.9	21
<i>S. aureus</i>	16	1.9	14	3.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	11	15.6	14	3.9	0	0.0	0	0.0	0	0.0	23
<i>S. pneumoniae</i>	13	7.8	10	15.6	10	15.6	0	0.0	0	0.0	16	1.9	0	0.0	10	15.6	15	1.9	0	0.0	0	0.0	11	15.6	24
<i>P. aeruginosa</i>	13	7.8	0	0.0	10	15.6	11	15.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	23
<i>S. epidermidis</i>	14	3.9	10	15.6	0	0.0	10	15.6	9	31.2	16	1.9	10	15.6	0	0.0	15	1.9	0	0.0	10	15.6	0	0.0	23
<i>E. faecalis</i>	11	15.6	0	0.0	15	1.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	21
<i>K. pneumonia</i>	10	15.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	23
<i>P. mirabilis</i>	13	7.8	0	0.0	11	15.6	0	0.0	0	0.0	19	0.9	17	1.9	16	1.9	17	1.9	0	0.0	0	0.0	11	15.6	23
<i>B. cereus</i>	16	1.9	12	7.8	13	7.8	0	0.0	11	15.6	16	1.9	12	7.8	0	0.0	15	1.9	0	0.0	0	0.0	11	15.6	23
<i>E. aerogenes</i>	15	1.9	11	15.6	10	15.6	14	3.9	0	0.0	14	3.9	10	15.6	9	31.2	14	3.9	0	0.0	0	0.0	10	15.6	23

A: Ethyl asetat extract, B: Aceton extract, C: Chloroform extract, D: Ethanol extract, IZ: Zone of Inhibition

antimicrobial activity against to only *S. epidermidis*. *P. aeruginosa*, *E. faecalis* and *K. pneumonia* were only isolate which were not inhibited by any of the extracts of *C. salonitana*, *C. balsamita* and *C. behen*. The results showed that the ethyl asetat extracts of *C. pseudoscabiosa* ssp. *glechnii* showed some degree of activity against some bacteria. In addition, chloroform extracts of all of the plants except for extract of *C. spicata* did not exhibited the significant antimicrobial activities against all the tested bacteria in this study (Table 1). MIC values of the extracts were between 0.9-31.2  $\mu\text{g mL}^{-1}$  as it was observed with the standard antimicrobials. The results of MIC and agar disc diffusion methods were supported to each other. As a result, particularly ethyl asetat extracts of *C. pseudoscabiosa* ssp. *glechnii* and *C. balsamita* and ethanol extract of *C. glastifolia* showed significant antibacterial activities which can be used as antimicrobial agents in new drugs for therapy of infectious diseases.

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