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PJBS

ISSN 1028-8880

**Pakistan
Journal of Biological Sciences**

ANSI*net*

Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

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^[1]. The genus *Centaurea* L. has been the subject of many antimicrobial activity studies^[2-7]. *C. behen* has traditionally been used for stomach treatment and to menstruate^[8]. *C. salonitana* has traditionally been used for tumor treatment^[9]. *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^[10,11] and the Minimum Inhibitory Concentration (MIC) was determined by Broth dilution method^[12].

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.

ACKNOWLEDGMENTS

We would like to thank MSc Tülay Tütenocaklı who participated in microbial study and Research Assistant Burcin Mutlu for this microbial material.

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