Ankara Ecz. Fak. Derg.
33 (3) 151 - 155, 2004

J. Fac. Pharm, Ankara
33 (3) 151 - 155 , 2004

ANTIMICROBIAL ACTIVITY SCREENING OF SOME *SESELI* L. SPECIES GROWING IN TURKEY

TÜRKİYE'DE YETİŞEN BAZI *SESELİ* L. TÜRLERİNİN ANTİMİKROBİYAL AKTİVİTE TARAMASI

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ABSTRACT

The antimicrobial activity of the n-hexane extracts obtained from aerial and underground parts and essential oils obtained by hydrodistillation from aerial parts of four Seseli L. species growing in Turkey (three of them are endemic for Turkey) have been screened in vitro against Gram-negative strains (Escherichia coli, Pseudomonas aeruginosa), Gram-positive strains (Staphylococcus aureus, Enterococcus faecalis, Bacillus subtilis, Bacillus cereus) and the fungus (Candida albicans) by agar disk-diffusion method. Some of the extracts and an essential oil of Seseli species showed antimicrobial activity.

Keywords: *Seseli L., Umbelliferae, Antimicrobial activity*

ÖZET

Türkiye'de yetişen 4 Seseli L. türünün toprak üstü ve toprak altı kısımlarından elde edilen n-hekzanlı ekstrelerin ve toprak üstü kısımlarından hidrodistilasyonla elde edilen uçucu yağların Gram-negatif (Escherichia coli, Pseudomonas aeruginosa), Gram-pozitif (Staphylococcus aureus, Enterococcus faecalis, Bacillus subtilis, Bacillus cereus) ve bir mantara (Candida albicans)'a karşı agar disk difüzyon metodu ile antimikrobiyal aktiviteleri taranmıştır. Ekstrelerden bazıları ve bir uçucu yağ antimikrobiyal aktivite göstermiştir.

Anahtar Kelimeler: *Seseli L., Umbelliferae, Antimikrobiyal aktivite*

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INTRODUCTION

Umbelliferae is a large and wide-spread family which is represented by almost 455 genera and ca. 3600-3750 species in the world. *Seseli* L. species is represented by 12 taxa (11 species and 1 subspecies) in the *Flora of Turkey* as *Seseli libanotis* (L.) W. Koch, *S. petraeum* Bieb., *S. gummiferum* Pall. ex Sm. subsp. *corymbosum* (Boiss. & Heldr.) P. H. Davis, *S. resinosum* Freyn & Sint., *S. peucedanoides* (Bieb.) Koso-Pol., *S. grandivittatum* (Somm. & Lev.) Schischkin, *S. tortuosum* L., *S. campestre* Besser, *S. andronakii* Woron., *S. foliosum* (Somm. & Lev.) Manden., *S. ramosissimum* Hartvig & Strid, *S. gummiferum* Pall. ex Sm. subsp. *gummiferum*, respectively. The name of *S. ramosissimum* Hartvig & Strid was changed to *S. hartvigii* Parolly & Nordt by Parolly and Nordt in a new revision (1-5).

Among these species, *Seseli tortuosum* L. (Turkish name is Horozgözü) is used to be emmenagogue and stomachic in Turkish folk medicine (6). Beside this, the leaves of *Seseli libanotis* (Turkish names are Kelemkeşir, Kelemenkeşir) is consumed to be vegetable in the eastern of Turkey (7).

In our previous studies, six coumarin were isolated from *n*-hexane extract of *S. gummiferum* subsp. *corymbosum*'s aerial parts and these compounds were established by all spectral and physical data (8). In addition, some endemic *Seseli* species were analysed by HPLC (9).

Here, antimicrobial activities of some *Seseli* species are reported for the first time in continuation of our researches.

MATERIAL and METHODS

Plant Material

Seseli gummiferum Pall. ex Sm. subsp. *corymbosum* (Boiss. & Heldr.) P. H. Davis, *Seseli gummiferum* Pall. ex Sm. subsp. *gummiferum, S. resinosum* Freyn. & Sint and *S. hartvigii* Parolly & Nordt (Umbelliferae) were collected from Antalya-Akseki, Kadife Mountains in August 2000 at an altitude of 1650-1900 m; Hasanoğlan, İdris Mountain in July 2000 at an altitude of 1600-1700 m; Bartın-Çakraz in July 2000 at an altitude of 5 m at the seaside; Antalya-Saklıkent, Bakırlar Mountain, in August 2000 at an altitude of 2300-2500 m, respectively. Voucher specimens were deposited at the Herbarium of Ankara University, Faculty of Pharmacy, successively by these numbers: AEF 21701, 21999, 21696, 21700. All species were identified by Prof. Dr. Hayri Duman from Gazi University, Faculty of Science and Letters.

Extraction of Plant Material

Aerial and underground parts of 4 species (10 g each) were extracted separately with *n*-hexane (150 ml) for 8 hours using a Soxhlet apparatus and evaporated to dryness.

The esssential oils were obtained by hydrodistillation from aerial parts of four *Seseli* species in a Clevenger type apparatus for 3 hours.

Disk Diffusion Method

The disk-diffusion method was used as a screening test for antimicrobial activity. The antimicrobial activity screening was performed using Mueller-Hinton Agar (Oxoid) for bacteria and Sabouraud Dextrose Agar (Oxoid) for yeast.

All extracts and essential oils were absorbed into sterilized blank disks having a diameter of 0.6 cm (Oxoid, lot/Ch.-B. 226700, England) in the amount of 0.02 mL. Then, they were kept and dried for a night (except for essential oils samples). Standart antibiotics disks such as cephazoline (30 µg), gentamycin (30 µg) and fluconazole (25 µg) were used as positive control. Disks absorbed pure *n*-hexane and petroleum ether served as negative control. Microorganisms, such as *Escherichia coli* ATTC 25922, *Pseudomonas aeruginosa* ATCC 27853, *Bacillus subtilis* ATCC 6633, *Bacillus cereus* RSKK 1122, *Staphylococcus aureus* ATCC 25923, *Staphylococcus aureus* ATCC 29213, *Enterococcus faecalis* ATCC 29212, *Candida albicans* ATCC 10231 were used in this study.

The residues obtained by the evaporation of the extracts dissolved in *n*-hexane and the essential oils were dissolved in petroleum ether to obtain 0.1 mg/mL separately in order to prepare the test soultions in concentration of 0.1 mg/mL each. Sterile paper disks of 0.6 cm diameter were impregnated with this solutions. These impregnated disks were applied on solid agar medium in petri dishes by pressing slightly. The treated petri dishes were left 10-15 minutes at room temperature and then incubated at 35 ±0.1 ºC for 16-20 hours for bacteria, 24-48 hours for fungus. After the incubation periods, inhibition zones were measured and compared with that of the references. These experiments were carried out in duplicate.

RESULTS and DISCUSSION

The *in vitro* antimicrobial activities of the extracts and essential oils of some *Seseli* L. species are shown in Table 1.

Table 1. **Antimicrobial activity of the extracts and essential oils of *Seseli* L. species**

Diameter of Inhibition Zone (mm)									
Plant	***Plant part***	**A**	**B**	**C**	**D**	***E***	**F**	**G**	**H**
Seseli gummiferum* subsp. *corymbosum	AP	θ	θ	θ	θ	θ	θ	θ	**8**
Seseli gummiferum* subsp. *corymbosum	UP	θ	θ	θ	θ	θ	θ	θ	θ
S. gummiferum* subsp. *gummiferum	AP	θ	θ	θ	θ	θ	θ	θ	**10**
S. gummiferum* subsp. *gummiferum	UP	θ	θ	θ	θ	θ	θ	θ	θ
S. resinosum	AP	**11**	**10**	θ	θ	θ	θ	θ	**8**
S. resinosum	UP	**10**	θ	θ	θ	θ	θ	θ	θ
S. hartvigii	AP	**12**	**11**	θ	θ	**8**	θ	θ	θ
S. hartvigii	UP	θ	θ	θ	θ	θ	θ	θ	θ
S. resinosum essential oil	AP	θ	**9**	θ	θ	θ	θ	θ	θ
Seseli gummiferum* subsp. *corymbosum essential oil	AP	θ	**8**	θ	θ	**8**	θ	θ	θ
S. gummiferum* subsp. *gummiferum essential oil	AP	**8**	**7**	θ	θ	**9**	**8**	θ	θ
S. hartvigii essential oil	AP	θ	θ	θ	θ	θ	θ	θ	θ
Cephazoline (30 µg)	St. A.	**20**	**20**	θ	θ	θ	θ	θ	θ
Gentamycin (30 µg)	St. A.	θ	θ	**21**	**17**	θ	θ	θ	θ
Fluconazole (25 µg)	St. A.	θ	θ	θ	θ	θ	θ	θ	**28**
Petroleum ether	control	θ	θ	θ	θ	θ	θ	θ	θ
***n*-Hexane**	control	θ	θ	θ	θ	θ	θ	θ	θ

A. *Staphylococcus aureus* (ATCC 25923) **B.** *Staphylococcus aureus* (ATCC 29213) **C.** *Escherichia coli* (ATCC 25922) **D.** *Pseudomonas aeruginosa* (ATCC 27853) **E.** *Bacillus subtilis* (ATCC 6633) **F.** *Bacillus cereus* (RSKK 1122) **G.** *Enterococcus faecalis* (ATCC 29212) **H.** *Candida albicans* (ATCC 10231)
θ: No Inhibition
AP: Aerial Part
UP: Underground Part
St. A.: Standart Antibiotic

The *n*-hexane extracts obtained from aerial parts of *S. resinosum* and *S. hartvigii* and also the essential oil obtained from aerial parts of *S. gummiferum* subsp. *gummiferum* exhibited antimicrobial activity against two strains of *Staphylococcus aureus* (ATCC 25923, 29213). In addition, the antimicrobial activity was also observed against *Staphylococcus aureus* (ATCC 25923) in *n*-hexane extract of underground parts of *S. resinosum.*

As it was known the plants and essential oils of Umbelliferae family have antimicrobial activity (10-12). In a previous study, the essential oil of *S. libanotis* was found to be potentially effective against *S. aureus* strains (10). In this frame, according to our study, the exhibition of the antimicrobial activity against *S. aureus* was shown similarity with the other reports.

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Received: 26.07.2004

Accepted: 10.12.2004