Iranian Journal of Pharmaceutical Research (2004) 3: 65-67
Received: October 2003
Accepted: December 2003

Short Communication

Composition of Essential Oil of *Artemisia persica* Boiss. from Iran

Omid Sadeghpour*[a], Gholamreza Asghari[b], Mohammad Reza Shams Ardekani[c]

[a]*Department of Pharmacognosy, Faculty of Pharmacy, Shiraz University of Medical Sciences, Shiraz, Iran.* [b]*Department of Pharmacognosy, Faculty of Pharmacy, Isfahan University of Medical Sciences, Isfahan, Iran.* [c]*Department of Pharmacognosy, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran.*

Abstract

The steam-distilled essential oil from *Artemisia persica* growing wild in Iran was analyzed by GC/MS. In all 50 compounds were identified; Davanone (60.56%), *Cis* Chrysanthenyl acetate (8.65%), Limonene (5.68%), α Pinene (3.74%), Davanone ether isomer + (3.6%) and α Thujene (3.6%) were the main components of the oil respectively.

Key Words: *Artemisia persica;* Asteraceae; essential oil; Davanone.

Introduction

The genus *Artemisia* (Asteraceae) is one of the largest and most widely distributed of the approximately 60 genera in the tribe anthemideae. This genus comprises a variable number of species, ranging from 200 to over 400, is predominantly distributed in the northern temperate region of the world in the 0-50 cm precipitation area (1). 29 of them are reported in Iran some are endemic (2, 3). As reported, some substances from the genus were shown antimalarial, antiviral, antitumor, antipyretic, antihemorrhagic, anticoagulant, antianginal, antioxidant, antihepatitis, antiulcerogenic, antispasmodic, anticomplementary, and interferon-inducing activity (1).

Numerous reports on essential oils composition of different *Artemisia* species, specially on those used in flavour industry and in medication, have been published (4). In a paper on monoterpene components of the genus *Artemisia,* analyzed three different samples of *A. persica* collected in different places; the main components were artemisia ketone for the first and second samples and β-thujone for the third sample (5). Also the presence of sesquiterpene coumarin ethers in *A. persica* has been reported (6-8).

* Corresponding author:
E-mail: sadeghpour@pharm.mui.ac.ir

Experimental

Aerial parts of *Artemisia persica* were collected in May 2002 on the karkas mountain, Alt. 2350 m Isfahan province, Iran. Recognized by Mr. Iraj Mehregan (Faculty of Sciences, University of Isfahan) (2). The voucher specimen is deposited in the herbarium of faculty of pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences (Voucher specimen No. 1277).

The air-dried aerial parts of plant was powdered and distilled for 1.5 hours (steam distillation). Then essential oil was injected, to GC-Mass apparatus (Hewlett-Packard 6890) equipped with a HP-5MS fused silica column (30m × 0.25 mm: film thickness0.25 μm) and interfaced with a Hewlett-Packard 6890 ion trap detector. The oven temperature was programmed from 60°C–280°C at rate 4°C/min. Helium was used as carrier gas at a flow rate of

2 ml/min. Other conditions of the instrument were as follows: ionization voltage, 70 eV; injector temperature, 280°C; ion source temperature, 200°C.

Identification of components of oil were based on GC retention indices relative to *n*-alkenes and computer matching with the WILEY275.L library, as well as by comparison of the fragmentation patterns of the mass spectra with those reported in the literature (9, 10)

Result and Discussion

The yield of essential oil was 0.40% of the dried plant. The identification of each compound was made by comparison of the mass spectra with a collection of literature spectra. Table 1 lists retention indices and concentrations of constituents of the essential oil of *Artemisia persica*.

GC-MS analysis of *A. persica* essential oil resulted in the detection of 47 components consisting of 38 (80.85%) monoterpenes, 6 (12.77%) sesquiterpenes, 2 (4.26%) Phenyl propanoid and 1 (2.13%) unknown component. The major constituents were Davanone (60.56%), *Cis* Chrysanthenyl acetate (8.65%), Limonene (5.68%), α Pinene (3.74%), Davanone ether isomer + (3.6%) and α Thujene (3.6%). The TLC results of the oil showed that davanone is the most predominate.

Several of the mono- and sesquiterpenes identified in *A. persica* essential oil were not presented in *A. persica* investigated before (8). Davanone, *Cis* Chrysanthenyl acetate (8.65%), Limonene, α Pinene, Davanone ether isomer + and α Thujene as the major component were detected (9-12).

Davanone is reported to occur in *A. pallens*(13, 14) and in *A. rehan* (15). Davanone and related compounds, have also been found in *A. douglasiana*, *A. herba alba*, *A. inculta*, *A. judaica*, *A. maritime subsp. maritime* and *A. persica* (17.1%) among other species (8, 14). Moreover, Davanone is obtained in one of the chemotypes of *Tanacetum vulgare* (8, 16). The essential oil of the plant *A. persica* is already studied by Bicchi C. et al. (8) and Stangl R, Greger H. (5) however the major compounds reported in the first study were in turn 1,8 Cineol, Davanone and *p*-Cymene. It is reported that the main components in the three samples collected in different places were artemisia ketone and β-thujone (5), so the majority of essential oil reported were artemisia ketone and β-thujone in contrast to our results that indicate to the presence of davanone as a major compound. The differences seem to be as a result of difference in the region of growth or chemotype variation (18).

Table 1. Composition of the essential oil of *Artemisia persica* Boiss.

Peak No.	Component	Retention Index	% of oil
1.	**α Thujene**	**925**	**3.06**
2.	**α Pinene**	**933**	**3.74**
3.	Camphene	946	0.62
4.	Sabinene	972	0.20
5.	6 methyl-5-hepten-2-one	984	0.02
6.	β Pinene	987	0.16
7.	*ortho*-Cymene	1022	0.44
8.	**Limonene**	**1026**	**5.68**
9.	1,8 Cineol	1030	1.18
10.	*cis* Ocimen	1035	0.02
11.	2(3H)-Furanone-5-ethyldihydro-5	1040	0.03
12.	Benzeneacetaldehyde	1042	0.01
13.	*trans* β Ocimene	1045	0.11
14.	γ Terpinene	1056	0.19
15.	*cis* Sabinene hydrate	1065	0.10
16.	A Terpinolene	1084	0.02
17.	Linalool	1098	2.55
18.	*trans*-Pinocarveol	1136	0.03
19.	Verbenol	1142	0.08
20.	Lavandulol	1165	0.21
21.	4-Terpineol	1174	0.13
22.	*para*-Cymen	1183	0.03
23.	α Terpineol	1187	0.46
24.	Myrtenol	1191	0.13
25.	Decanal	1199	0.06
26.	Nordavanone	1227	0.16
27.	Thymyl Methyl Ether	1230	0.29
28.	Benzaldehyde, 4-(1-methylmethyl)-	1236	0.02
29.	**Cis *Chrysanthenyl acetate***	**1263**	**8.65**
30.	Bornyl acetate	1280	0.05
31.	Lavandulyl acetate	1286	0.05
32.	Carvacrol	1291	0.14
33.	Hexyl Tiglate	1326	0.05
34.	Eugenol	1353	0.02
35.	Neryl Acetate	1360	0.02
36.	Geranyl Acetate	1379	0.17
37.	*cis*-Jasmone	1393	0.10
38.	Methyl Eugenol	1399	0.46
39.	*trans* Caryophyllene	1412	1.16
40.	Linalyl 2-methylpropanoate	1418	0.13
41.	α Humulene	1444	0.08
42.	D-Germacrene	1472	0.19
43.	***Davanone ether isomer* +**	**1509**	**3.6**
44.	Caryophyllene oxide	1574	0.89
45.	***Cis*-Davanone**	**1608**	**60.56**
46.	Unknown	1621	1.16
47.	α Bisabolol	1683	1.83

References

(1) Tan RX, Zheng WF, Tang HQ. Biologically Active Substances from the Genus *Artemisia. Planta Medica* (1998) 64: 295-302

(2) Rechinger KH. *Flora Iranica*. No. 158. Akademische Druck-u. Verlagsanstalt. Graz (1986)

(3) Mozafarian V. *Study and Recognition of Iranian Artemisia spp.* (Supervised by Ghahraman A.) Tehran University of Sciences, Tehran (1988)

(4) Gilemeister E, Hoffmann F. *Die Aetherischen Ole.* 4th ed. Vol VII. Academic Verlag. Berlin (1961) 733

(5) Stangl R, Greger H. Monoterpenes and Systematics of the genus *Artemisia* (Asteraceae; Anthemideae). *Plant Syst. Evol.* (1980) 136:125

(6) Greger H, Hofer O, Nikiforov A. New Sesquiterpene Coumarin Ethers from *Achillea* and *Artemisia species*. *J. Nat. Prod.* (1982) 45:455

(7) Hofer O, Greger H. Naturally Occuring Sesquiterpene- Coumarin Ethers. New Sesquiterpene-Coumarine Ethers from *Anthemis cretica*. *Phytochemistry*. (1984) 23:181

(8) Bicchi C, Frattini C, Sacco T. Essential Oils of Three Asiatic Artemisia Species. *Phytochemistry*. (1985) 24:2440-2442

(9) Adams rp. *Identification of Essential Oil Components by Gas Chromatography/ Mass Spectroscopy*. Allured Pub. Corp. Illinoise (1995)

(10) Swigar AA, Silverstien RM. *Monoterpenes*: *Infrared, Mass,* ^{1}*H-NMR,* ^{13}*C-NMR Spectra and Kovats Indices*. Aldrich Chemical Company Inc. Wisconsin (1981)

(11) Mclafferty F.W., Stauffer D.B., The Important Peak Index of the Registry of Mass Spectral Data, John wiley&Sons Inc, New York (1991) 2255

(12) Molander G.A., Haas J., Total synthesis of (±)-davanone, *Tetrahedron* (1999) 55: 617

(13) Baslas KK. A Review of Investigations on 30 Indian Essential Oils. *Perfume Essent. Oil Rec.* 58(7), (1967) 437

(14) Lewis YS, Nambudiri ES. Composition of Davana Oil, Some Preliminary Studies. *Perfume Essent. Oil Rec.* 58(9), (1967) 613

(15) Abegaz B, Yohannes PG. Constituents of Essential Oil of *Artemisia rehan*. *Phytochemistry* (1982) 21:1791

(16) Marco JA, Barbera O.Natural Products from the Genus *Artemisia* L. In: Atta-ur-rahman. (ed) *Studies in Natural Products Chemistry*. Vol. 7 Elsevier Science Publication, Amsterdam (1990) 201-264.

(17) Hethelyi E, Tetenyi P, Kettenes-van den Bosch JJ, Salemink CA, Herma W,Versluis C, Kloosterman J, Sipma J. Essential Oils of five *Tanacetum vulgare* genotypes. *Phytochemistry* (1981) 20:1847

(18) Perez-Alonso M. J., Velasco-Negueruela A., Palá-Paúl J. and Sanz J.,Variations in the essential oil composition of *Artemisia pedemontana* gathered in Spain: chemotype camphor-1,8-cineole and chemotype davanone, *Biochem. Sys. Ecol.,* (2003) 31: 77