Nat. Volatiles & Essent. Oils, 2018; 5(2): 19-23

NVEO
Natural Volatiles & Essential Oils

RESEARCH ARTICLE

Essential oil composition of *Zosima absinthifolia* (Vent.) Link from Northern Cyprus

Omar Aburwais[1], Azmi Hanoglu[1], Betül Demirci[2] and K. Hüsnü Can Başer[1,*]

[1] Department of Pharmacognosy, Near East University, Faculty of Pharmacy, Lefkoşa, N. Cyprus, Mersin 10, TURKEY
[2] Department of Pharmacognosy, Anadolu University, Faculty of Pharmacy, Eskişehir, TURKEY

*Corresponding author. Email: khcbaser@gmail.com

Abstract

Hydrodistilled essential oils from dried fruits of *Zosima absithifolia* (Vent.) Link (Apiaceae) collected from Northern Cyprus was analyzed by Gas Chromatography-Flame Ionization Detector (GC-FID) and Gas Chromatography/Mass Spectrometry (GC/MS). Octyl acetate (63.2-59.5%), octyl hexanoate (19.8-18.6%), octyl octanoate (9.9-9.2%) and octanol (7.1-2.2%) were characterized as main constituents.

Keywords: *Zosima*, Apiaceae, Essential Oil

Introduction

Zosima absinthifolia (Vent.) Link is a perennial herb found in the family Apiaceae. This plant is a widely distributed from Iran to Turkey, Central Asia, Afghanistan and Pakistan. It normally grows in fields, steppe, and lime stone slopes at an altitude of the range 400-2000 m (Davis, 1972).

It is known as “Peynir otu” or “Ayı eli” in Turkey and used as digestive, antiinflammatory and carminative in Turkey (Bahadir et al., 2010). It is a cheese ingredient and is eaten as food after cooked (Aksakal & Kaya, 2008; Ozcelik, 1994). In Pakistan, it is used for bowel disorders and in the treatment of cough (Goodman & Ghafoor, 1992).

While an ethanolic extract showed antimicrobial activity (Al-Shamma & Mitscher 1979), a methanolic extract possessed anti-oxidative, phytotoxic and anti-proliferative activities (Razavi et al., 2008). Essential oil was also shown to have antibacterial activity (Najed-Ebrahim & Razavi, 2008).

Isolation of coumarins and alkaloids have been reported (Crowden et al., 1969; Razavi & Samad, 2009; Razavi et al., 2013).

Previously, Başer et al. (2000) and Razavi et al. (2009) reported essential oil composition of fruits from Turkey and Iran, respectively (Başer et al., 2000) (Razavi et al., 2009).

Here, we report on the chemical composition of fruit essential oils collected from Alevkayası near Girne (Kyrenia) from Northern Cyprus. To the best of our knowledge, this is the first report of *Zosima* from Cyprus.

Materials and Methods

Fruits of *Zosima absinthifolia* were collected from Alevkayası on June 1, 2016 and from the garden of Armenian Monastery at Alevkayasi on May 3, 2916. The plants were identified by one of us (KHCB). Voucher specimens were deposited in the Herbarium of Near East University (NEUN 6887 and 6894). Dried fruits were hydrodistilled using a Clevenger-type apparatus for 3 h. Oil yield was 0.05% on moisture-free basis.

Gas Chromatography Mass Spectroscopy (GC-MS)

The essential oils of *Zosima absinthifolia* were characterized using GC-MS system. The GC-MS analysis was carried out with an Agilent 5975 GC-MSD system. Innowax FSC column (60 m x 0.25 mm, 0.25 mm film thickness) was utilized with helium as carrier gas (0.8 ml/min). GC oven temperature was kept at 60°C for 10 min and programmed to 220°C at a rate of 4°C/min, and kept constant at 220°C for 10 min and then modified to 240°C at a rate of 1°C/min. Split ratio was adjusted at 40:1. The injector temperature was set at 250°C. Mass spectra were recorded at 70 eV. Mass range was from m/z 35 to 450.

Gas Chromatography Flame Ionization Detector (GC-FID)

The GC analysis was carried out using an Agilent 6890N GC system. FID detector temperature was 300°C. To obtain the same elution order with GC-MS, simultaneous auto-injection was done on a duplicate of the same column applying the same operational conditions. Relative percentage amounts of the separated compounds were calculated from FID chromatograms Identification of the essential oil components were carried out by comparison of their relative retention times with those of authentic samples or by comparison of their relative retention index (RRI) to series of n-alkanes. Computer matching against commercial (Wiley GC/MS Library, MassFinder 3 Library) (Mac Lafferty & Stauffer, 1989) and (Koenig et al., 2004) and *in-house* "Başer Library of Essential Oil Constituents" built up by genuine compounds and components of known oils, as well as MS literature data (Koenig et al., 1998; Boelens, 1999) were used for the identification.

Results and Discussion

The oils were analyzed by GC-FID and GC/MS. The Girne/ Alevkayası Armenian Monastery sample showed 32 compounds representing 99.5 percent of the oil. Octyl acetate (63.2%), octyl hexanoate (18.6%), octyl octanoate (9.2%) and octanol (2.2%) were characterized as main constituents. Octyl acetate (63.2%), octyl hexanoate (18.6%), octyl octanoate (9.2%) and octanol (2.2%) were characterized as main constituents. Girne/ Alevkayası sample similarly showed 14 compounds representing 99.6 percent of the total oil. Octyl acetate (59.5%), octyl hexanoate (19.8%), octyl octanoate (9.9%) and octanol (7.1%) were characterized as major constituents (Table 1 and 2).

There are two previous reports on the essential oil composition of *Z. absinthifolia* fruits. Başer et al. (2000) reported that octyl acetate (38.9%), octyl hexanoate (31.9%) and octanol (12.9%) were the main constituents in the oil of *Z. absinthifolia* collected in Turkey. Razavi et al. (2009) reported the essential oil composition of *Z. absinthifolia* fruits of Iran origin as octyl acetate (87.5), Octyl octanoate (5.0%), octanol (2.4%), hexyl hexanoate (1.5%) and octanoic acid (1.1%) as main constituents. Our results are in accordance with the previous reports.

Major constituents octyl acetate, octyl hexanoate, octyl octanoate and octanol have previously been reported as main constituents from other *Heracleum* oils. Hajhashemi et al. (2009) reported octyl acetate (16.5%) as main constituent of fruit oil of *H. persicum* Desf. ex Fisch. (Hajhashemi et al., 2009).

1-Octanol (13.6% and octyl hexanoate (8.1%) were reported as main constituents of the *Heracleum sibiricum* L. oil. Its antibacterial activity was also investigated (Miladinovic et al., 2013).

Antibacterial activity and chemical composition showing octyl acetate (93.7%) as main constituent of the essential oils of *Heracleum sphondylium* L. subsp. *ternatum* (Velen) Brummit were reported (Iscan et al., 2004).

Table 1: Essential oil composition of *Z. absinthifolia* collected from Girne/ Alevkayası in Armenian Monastery location

LRI	**Compound**	**%**
1032	α-Pinene	tr
1048	2-Methyl-3-buten-2-ol	0.1
1093	Hexanal	0.1
1194	Heptanal	0.1
1244	2-Pentyl furan	tr
1255	γ-Terpinene	0.1
1280	*p*-Cymene	tr
1296	Octanal	0.3
1327	3-Methyl-2-butenol	tr
1400	Nonanal	0.1
1483	Octyl acetate	63.2
1516	(*Z*)-4-Octenyl acetate	0.5
1535	β-Bourbonene	tr
1562	Octanol	2.2
1612	β-Caryophyllene	0.5
1623	Octyl butyrate	1.0
1634	Octyl 2-methyl butyrate	0.1
1726	Germacrene D	0.1
1755	Bicyclogermacrene	0.1
1829	Octyl hexanoate	18.6
1856	(*Z*)-4-Octenyl hexanoate	0.1
1893	Octyl heptanoate	tr
2008	Caryophyllene oxide	0.2
2020	Octyl octanoate	9.2
2084	Octanoic acid	0.3
2144	Spathulenol	0.1
2298	Decanoic acid	0.1
2300	Tricosane	0.4
2500	Pentacosane	0.1
2503	Dodecanoic acid	0.7
2670	Tetradecanoic acid	0.8
2931	Hexadecanoic acid	0.4
	Total	99.5

LRI: Linear retention indices calculated against *n*-alkanes. %: calculated from FID data. tr: Trace (<0.1%)

Table 2: Essential oil composition of *Z. absinthifolia* fruits collected from Girne/ Alevkayası location

LRI	Compound name	%
1303	Octanal	0.3
1487	Octyl acetate	59.5
1522	(*Z*)-4-octenyl acetate	0.5
1567	Octanol	7.1
1611	(*Z*)-3-octen-1-ol	tr
1628	Octyl butyrate	1.7
1638	Octyl-2-methyl butyrate	tr
1743	7-epi-1,2-dehydro-sesquicineole	0.1
1757	Octyl angelate	0.1
1824	Octyl hexanoate	19.8
1862	(Z)-4-octenyl hexanoate	0.1
2022	Octyl octanoate	9.9
2063	3-Octyl octenoate	0.3
2243	α-Bisabolol	0.1
	Total	99.6

LRI: Linear retention indices calculated against *n*-alkanes. %: calculated from FID data. tr: Trace (<0.1%)

REFERENCES

Aksakal O. and Kaya Y. (2008). Plants used as a food in Erzurum and province. 10th Turkish Food Conference, Erzurum, TURKEY, pp 21-23.

Al-Haiza M.A., Mostafa M.S., El-kady M.Y. (2005). *Scientific Journal of King Faisal University (Basic and Applied Sciences), 6*(1), 1426.

Al-Shamma A., Mitscher L.A. (1979). Comprehensive survey of indigenous Iraqi plants for potential economic value, screening results of 327 species of alkaloids and antimicrobial agents. *Journal of Natural Products, 42*(6), 633-642.

Bahadır O., Çitoğlu G.S., Özbek H. (2010). Evaluation of anti-inflammatory effect of *Zosima absinthifoli*a and deltoin, *Journal of Medicinal Plants Research, 4,* 909-14.

Başer K.H.C., Özek T., Demirci B., Kürkçüoğlu M., Aytaç Z., Duman H. (2000). Compositions of the essential oil of *Zosima absinthifolia* (Vent). Link and *Ferula elaeochytris* Korovin from Turkey. *Flavour fragrance Journal, 15*, 371-372.

Boelens M. (1999). The complete database of essential oils, Boelens Aroma chemical information service. Netherlands.

Crowden R.K., Harborne J.B., Heywood V.H. (1969). Chemosystematics of the umbelliferae. A general survey. Phytochemistry (8), 1963-1984.

Davis P.H. (1972). *Flora of Turkey* and the east Aegean islands. Edinburgh: Edinburgh University Press.

Goodman, S. M., & Ghafoor, A. (1992). The Ethnobotany of southern Balochistan, Pakistan, with particular reference to medicinal plants. *Publication/field museum of natural history*.

Hajhashemi, V., Sajjadi, S. E., & Heshmati, M. (2009). Anti-inflammatory and analgesic properties of *Heracleum persicum* essential oil and hydroalcoholic extract in animal models. *Journal of Ethnopharmacology*, *124*(3), 475-480.

Işcan G., Özek T., Duran A., Başer K.H.C. (2004). Essential oils of three species of *Heracleum.* Anticandidal activity. *Chemistry of Natural Compounds, 40*(6), 544-547.

Koenig W.A., Joulain D., Hochmuth D.H. (1998). The atlas of spectra data of sesquiterpene hydrocarbons. EB-Verlag, Hamburg.

Koenig W.A., Joulain D., Hochmuth D.H. (2004). *Terpenoids and and related constituents of essential oils, Mass Finder 3.* Hamburg, Germany.

Mac Lafferty F.W., Stauffer D.B. (1989). The Wiley / NBS Registry of Mass Spectral Data. Wiley and Sons, Penn.(USA).

Menemen, Y., & Jury, S. L. (2001). Taxonomic studies on the genus Zosima HOFFM.(Umbelliferae). *Annalen des Naturhistorischen Museums in Wien. Serie B für Botanik und Zoologie*, 557-571.

Miladinovic D.L., Ilic B.S., Mihajilov-Krstev T.M., Nikolic D.M., Cvetkovic O.G., Markovic M.S., Miladinovic L.C. (2013). Antibacterial activity of the essential oils of *Heracleum sibiricum*. *Natural Product Communications*, *8*(9), 1309-1311.

Ozcelik H. (1994). On the herbal cheese from East Anatolia (Turkey). *Economic Botany, 2*(48), 214-221.

Razavi, S. M., Ghasemiyan, A., Salehi, S., & Zahri, F. (2009). Screening of biological activity of *Zosima absinthifolia* fruits extracts. *EurAsian Journal of BioSciences*, 4, 25-28.

Razavi, S. M., Imanzadeh, G., Jahed, F. S., & Zarrini, G. (2013). Pyranocoumarins from *Zosima absinthifolia* (Vent) link roots. *Russian Journal of Bioorganic Chemistry, 39*(2), 215-217.

Razavi, S. M., Nazemiyeh, H., Hajiboland, R., Kumarasamy, Y., Delazar, A., Nahar, L., & Sarker, S. D. (2008). Coumarins from the aerial parts of *Prangos uloptera* (Apiaceae). *Revista Brasileira de Farmacognosia, 18*(1), 1-5.

Razavi, S. M., & Nejad-Ebrahimi, S. (2010). Chemical composition, allelopatic and antimicrobial potentials of the essential oil of *Zosima absinthifolia* (Vent.) Link fruits from Iran. *Natural Product Research*, *24*(12), 1125-1130.