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SHORT COMMUNICATION

Essential oil compositions and anticholinesterase activities of two edible plants *Tragopogon latifolius* var. *angustifolius* and *Lycopsis orientalis*

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This is the first report in the literature on essential oil compositions of *Tragopogon latifolius* var. *angustifolius* and *Lycopsis orientalis* which were analysed by using GC-FID and GC-MS techniques. The main constituents of *T. latifolius* var. *angustifolius* were identified as α -selinene (10.5%), 2,5-di-*tert* octyl-*p*-benzoquinone (9.5%) and valencene (7.0%); however, the main components of *L. orientalis* were identified as heptacosane (10.5%), τ -muurolene (9.6%) and tetratetracontane (9.4%). The essential oils of *T. latifolius* var. *angustifolius* and *L. orientalis* species exhibited moderate inhibitory activity against acetyl- and butyryl-cholinesterase enzymes at 200 μ g/mL.

Keywords: *Tragopogon*; *Lycopsis*; essential oil; anticholinesterase

1. Introduction

Tragopogon L., represented by 21 species in Turkey and 84 species in the world (Coskunlebi & Göztepe 2012), belongs to the family Asteraceae, tribe Lactuceae. *Tragopogon latifolius* Boiss. is distributed in south and east Transcaucasia, and its two varieties were reported in Turkey, namely *T. latifolius* Boiss. var. *latifolius* and *T. latifolius* Boiss. var. *angustifolius* Boiss. The latter, used as wound healing and as a food source in Anatolia (Yesil & Akalin 2010–2011), is known as Ispink and Yemlik (Yesil & Akalin 2010–2011; Coskunlebi & Göztepe 2012). *T. latifolius* Boiss. var. *angustifolius* Boiss. can be consumed either raw or cooked (Yesil & Akalin 2010–2011).

Studies indicated that *Tragopogon porrifolius* possessed gallic acid, epigallocatechin, catechin and epigallocatechin gallate contents (Spina et al. 2008). Moreover, some polyphenol contents were also reported from *Tragopogon pratensis* (Wegiera et al. 2012). It has been demonstrated that the ethanolic extract of this species exhibits antileukaemic activity by inducing apoptosis on J-45.01 human acute T leukaemia cell line (Wegiera et al. 2012). Oleanane triterpenoids and volatile constituents of *T. pratensis* and *T. porrifolius* L. were investigated, respectively (Miyase et al. 1992; Formisano et al. 2010; Riu-Aumatell et al. 2011). *Lycopsis* L., represented by one species (*Lycopsis orientalis* L.) in Turkey and two species in the world (Koruklu 2012), belongs to the family Boraginaceae. *L. orientalis* is distributed in Balkan Peninsula and *Anchusa arvensis* (L.) Bieb. subsp. *orientalis* (L.) Nordh. is synonym of this species in Norsk Flora (Nordhagen 1940). *A. arvensis* subsp. *orientalis*, known as Frez, Kara

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Table 1. Chemical composition of the essential oil from *T. latifolius* var. *angustifolius* (TLA) and *L. orientalis* (LO).

RI ^a	Constituents ^b	TLA (%)	LO (%)	RI ^a	Constituents ^b	TLA (%)	LO (%)
865	Isononane	1.4	–	1876	Hexadecanol	2.8	–
970	3-Methyl nonane	2.8	–	1890	2-Methyl-1-hexadecanol	3.3	–
1249	1,3-Di- <i>tert</i> butylbenzene	4.9	1.4	2109	Heptacosane	3.2	1.7
1276	Carvone oxide	1.7	–	2156	1-Nonadecanol	2.4	2.4
1344	Dihydro carvyl acetate	–	3.5	2171	Butyl phthalate	1.9	1.8
1368	Mint furanone	–	5.4	2200	Docosane	1.9	–
1409	Caryophyllene	1.5	–	2243	9-Hexylheptadecane	1.6	–
1447	β -Farnesene	1.4	–	2259	2,5-Di- <i>tert</i> octyl-p-benzoquinone	9.5	5.6
1480	τ -Muurolene	–	9.6	2366	Arachidic acid	3.4	2.5
1484	Valencene	7.0	1.8	2407	Tetracosane	3.9	2.0
1498	α -Selinene	10.5	9.2	2413	3-Ethyl-5-(2-ethylbutyl)octadecane	2.6	3.3
1505	β -Himachalene	1.8	–	2700	Heptacosane	1.7	10.5
1528	α -Muurolene	1.9	–	2852	1-Hexacosanol	3.5	–
1583	Caryophyllene oxide	1.7	–	2896	Choleic acid	1.5	2.1
1677	Cadalene	1.8	–	2900	Nonacosane	2.3	1.7
1746	2-Methyl heptadecane	3.0	1.5	3094	Ethyl iso-allochololate	–	3.7
1778	Pentadecanol	1.4	–	3508	17-Pentatriacontene	–	1.2
1800	Octadecane	3.0	1.4	3600	Hexatriacontane	–	8.5
				4400	Tetratetracontane	–	9.4
					Total	91.3	90.2

^a Retention indices (DB-5 column).^b A non-polar Phenomenex DB-5 fused silica column.

dinding, Mijik, is used as diuretic and food supplement (Yeşil & Akalin 2010–2011). *L. orientalis* can be consumed either raw or cooked (Yesil & Akalin 2010–2011). Aqueous extract of *L. orientalis* was evaluated on algaesthesia and skin ulcer in mice (Hai-Gang & Wen-Xiao 2009). Moreover, pyrrolizidine alkaloids were isolated from different parts of *A. arvensis* (Syn. *Lycopsis arvensis*) (El-Shazly et al. 1998).

Depending on the life expectancy and the ageing of the world's population, various health problems come into prominence both socially and economically. Recently, a single drug group, acetyl-cholinesterase inhibitors, has been used in the treatment of Alzheimer's disease. Nonetheless, the availability of only this group of drugs to treat mild to moderate Alzheimer's disease and their side effects make it necessary to discover new anti-Alzheimer's drugs to treat the disease. Nowadays, increase in chronic diseases and cancers besides the extension of human life has triggered the interest in natural drugs (Howes et al. 2003).

This study aims to analyse the *T. latifolius* var. *angustifolius* and *L. orientalis* together and compare the results since their cooking and consumption patterns are similar (Yesil & Akalin 2010–2011). To the best of our knowledge, there is no report on the chemical properties and acetyl- and butyryl-cholinesterase activities of *T. latifolius* var. *angustifolius* and *L. orientalis* in the literature.

2. Results and discussion

The whole plants of *T. latifolius* var. *angustifolius* and *Lycopsis orientalis* L. were collected from southeastern part of Turkey (Malatya) in June (flowering period) 2012. The specimens have been deposited at the Herbarium of Istanbul University (ISTE 10012 and ISTE 9803, respectively). The essential oils of *T. latifolius* var. *angustifolius* and *L. orientalis* were obtained using a Clevenger apparatus by hydrodistillation from the whole parts of *T. latifolius* var. *angustifolius* and *L. orientalis*. Their compositions were identified by GC-FID and GC-MS analyses (Tel et al. 2013). Thirty components, constituting 91.3% of the essential oil composition of *T. latifolius* var. *angustifolius*, and 22 components, constituting 90.2% of the essential oil composition of *L. orientalis*, were determined. The main constituents of the essential oil of *T. latifolius* var. *angustifolius* were identified as α -selinene (10.5%), 2,5-di-*tert* octyl-*p*-benzoquinone (9.5%) and valencene (7.0%) (Table 1).

The sole two studies in the literature on the volatile constituents of the *Tragopogon* species reported that the main constituents of the essential oil of *T. porrifolius* were 4-vinyl guaiacol (19.0%), hexadecanoic acid (17.9%) and hexahydrofarnesylacetone (15.8%) (Formisano et al. 2010; Riu-Aumatell et al. 2011). Only tetracosane, heptacosane and nanocosane hydrocarbon compounds were identified in the essential oil compositions of these two species of the same genus. However, the species reported herein displayed different essential oil patterns.

There was only a study on the essential oil composition of one *Tragopogon* species, this fact increases the importance of the present work. (Formisano et al. 2010; Riu-Aumatell et al. 2011).

The main constituents of the essential oil of the second plant of this study, *L. orientalis*, were identified as heptacosane (10.5%), τ -muurolene (9.6%) and tetratetracontane (9.4%) (Table 1).

This study is the first report on the chemical constituents of this genus and species. In this sense, this study will be an important data for *Lycopsis* species.

Since antioxidant and anticholinesterase capacities are two important parameters in using edible plants as food supplements, we aimed to study the potential of these two plants in terms of these biological activities. Acetyl- and butyryl-cholinesterase inhibitory activities were investigated by using Ellman method (Ellman et al. 1961; Ozturk et al. 2011). Essential oils of *T. latifolius* var. *angustifolius* (55.40% and 46.50%, respectively) and *L. orientalis* (48.49% and 43.65%) exhibited moderate inhibitory activities against butyrylcholinesterase and acetylchol-

inesterase enzymes at 200 µg/mL. Galanthamine was used as a standard, which exhibited 82.54% butyryl- and 85.22% acetyl-cholinesterase inhibitory effects at the same concentrations.

3. Conclusion

In spite of these two species exhibiting moderate anticholinesterase activity, we still believe that our results are important data because these species are widely consumed in Turkey. Thus, further phytochemical and biological studies could be carried out to identify their active constituents.

Supplementary material

Supplementary material relating to this article is available online.

References

- Coskuncebi K, Göztepe M. 2012. *Tragopogon* L. In: Guner A, Aslan S, Ekim T, Vural M, Babac MT, editors. Türkiye bitkileri listesi/damarlı bitkiler. Istanbul: Nezahat Gokyigit Botanik Bahcesi ve Flora Arastirmalari Derneği Yayını; p. 211–212.
- Ellman GL, Courtney KD, Andres V, Featherstone RM. 1961. A new and rapid colorimetric determination of acetylcholinesterase activity. *Biochem Pharmacol.* 7:88–95.
- El-Shazly A, Domiaty M, Witte L, Wink M. 1998. Pyrrolizidine alkaloids in members of the Boraginaceae from Sinai (Egypt). *Biochem Syst Ecol.* 26:619–636.
- Formisano C, Rigano D, Senatore F, Bruno M, Rosselli S. 2010. Volatile constituents of the aerial parts of white salsify (*Tragopogon porrifolius* L., Asteraceae). *Nat Prod Res.* 24:663–668.
- Hai-Gang Z, Wen-Xiao S. 2009. Effects of aqueous extract from *Lycopsis orientalis* Linn on algaesthesia and skin ulcer in mice. *J Pharmacol Sci.* 109:149.
- Howes MJR, Perry NSL, Houghton PJ. 2003. Plants with traditional uses and activities relevant to the management of Alzheimer's disease and other cognitive disorders. *Phytother Res.* 17:1–18.
- Koruklu ST. 2012. *Lycopsis* L. In: Guner A, Aslan S, Ekim T, Vural M, Babac MT, editors. Türkiye bitkileri listesi/damarlı bitkiler. Istanbul: Nezahat Gokyigit Botanik Bahcesi ve Flora Arastirmalari Derneği Yayını; p. 230.
- Miyase T, Kohsaka H, Ueno A. 1992. Tragopogonosides-A-I, oleanane saponins from *Tragopogon pratensis*. *Phytochemistry.* 31:2087–2091.
- Nordhagen R. 1940. *Lycopsis* L. In: Lid J, Lid DT, editors. Norsk flora. Oslo: Aschehoug; p. 526.
- Ozturk H, Kolak U, Meric C. 2011. Antioxidant, anticholinesterase and antibacterial activities of *Jurinea consanguinea* DC. *Rec Nat Prod.* 5:43–51.
- Riu-Aumatell M, Vargas L, Vichi S, Guadayol JM, Lopez-Tamames E, Buxaderas S. 2011. Characterisation of volatile composition of white salsify (*Tragopogon porrifolius* L.) by headspace solid-phase microextraction (HS-SPME) and simultaneous distillation-extraction (SDE) coupled to GC–MS. *Food Chem.* 129:557–564.
- Spina M, Cuccioloni M, Sparapani L, Acciarri S, Eleuteri AM, Fioretti E, Angeletti M. 2008. Comparative evaluation of flavonoid content in assessing quality of wild and cultivated vegetables for human consumption. *J Sci Food Agric.* 88:294–304.
- Tel G, Ozturk M, Duru ME, Dogan B, Harmandar M. 2013. Fatty acid composition, antioxidant, anticholinesterase and tyrosinase inhibitory activities of four *Serratula* species from Anatolia. *Rec Nat Prod.* 7:86–95.
- Wegiera M, Smolarz HD, Jedruch M, Korczak M, Kopron K. 2012. Cytotoxic effect of some medicinal plants from Asteraceae family on J-45.01 leukemic cell line – pilot study. *Acta Pol Pharm.* 69:263–268.
- Yesil Y, Akalin E. 2010–2011. The use of wild edible plants in Kürecik (Akçadağ/Malatya). *J Fac Pharm Istanbul.* 41:90–103.