

Chemical Composition of the Essential Oil of *Scutellaria orientalis* L. subsp. *virens* (Boiss. & Kotschy) J. R. Edm. from Turkey

Türkiye'de yetişen *Scutellaria orientalis* L. subsp. *virens* (Boiss. & Kotschy) J. R. Edm. Uçucu Yağının Kimyasal Kompozisyonu

Research Article

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ABSTRACT

In this study, chemical composition of the essential oil of *Scutellaria orientalis* L. subsp. *virens* (Boiss. & Kotschy) J. R. Edm (Lamiaceae), collected from Malatya, Turkey, was determined. The essential oil was obtained by hydrodistillation from the aerial parts and analyzed by gas chromatography-mass spectrometry. Thirty three constituents were identified from the essential oil of *Scutellaria orientalis* subsp. *virens* representing 89.29% of total. β -Caryophyllene (22.08%), γ -Cadinene (19.92%), Camphene (6.00%) and Calarene (5.94%) are established as the major components of the essential oil. The results of the analyzed taxa are compared with the previous studies.

Key Words

Endemic, essential oil composition, *Scutellaria*, Lamiaceae.

ÖZET

Bu çalışmada, Malatya, Türkiye'den toplanan *Scutellaria orientalis* L. subsp. *virens* (Boiss. & Kotschy) J. R. Edm (Lamiaceae) bitkisinin uçucu yağının kimyasal kompozisyonu belirlenmiştir. Uçucu yağ, bitkinin toprak üstü kısımlarından su distilasyonu ile elde edilmiş ve gaz kromatografisi - kütle spektrometresi ile analiz edilmiştir. *Scutellaria orientalis* subsp. *virens* bitkisinin uçucu yağının %89.29' ini oluşturan 33 bileşik tespit edilmiştir. β - Karyofillen (%22.08), γ - Kadinen (%19.92), Kamfen (%6.00) ve Kalaren (%5.94) uçucu yağın ana bileşenleri olarak belirlenmiştir. Analiz sonuçları mevcut çalışmaların sonuçları ile karşılaştırılmıştır.

Anahtar Kelimeler

Endemik, uçucu yağ kompozisyonu, *Scutellaria*, Lamiaceae

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INTRODUCTION

The genus *Scutellaria* L. is an aromatic member of Lamiaceae including approximately 360 species in the world [1]. In Turkey, the genus is represented by 17 species (38 taxa) [2].

S. orientalis L. s.l. used in folk medicine such as hemostatic, constipate, wound healing agent and tonic [3]. A decoction prepared from the aerial parts of the plant used as astringent [4].

Phytochemical researches on *S. orientalis* s.l. are the subject of several studies and, consequently, neo-clerodane diterpenoids and two phenethyl alcohol glycosides were isolated [5-7]. In addition, an essential oil research about *Scutellaria orientalis* subsp. *virens*, from Iran, is given by Delnavazi et al. (2014) [8].

MATERIALS AND METHODS

Plant material and Isolation of the essential oils

Aerial parts of *Scutellaria orientalis* subsp. *virens* were collected in the blooming stage from Malatya province, in Turkey (Collector No: Arabacı 2770). The specimens were dried by air drying method. The aerial parts were hydrodistilled for 3 h using a Clevenger-type apparatus. As a small amount of essential oil was present, the oil was trapped with n-hexane, which were dried over anhydrous Na₂SO₄ and stored at 4°C until use. Voucher specimen of species is deposited in the herbarium of the Faculty of Pharmacy, Inonu University, Malatya, Turkey.

Gas chromatography/mass spectrometry (GC-MS) analysis

Agilent Technologies 6890N Network system gas chromatograph equipped with a FID and HPInnowax column (60 mx0.25 mm i.d., 0.25 µm film thickness) was used for GC/MS analyses. Injector and detector were heated at 250°C. The oven heated linearly from 60 to 250°C (5°C/min), and then kept constant at 250°C for 20 min. Helium was used as the carrier gas, at a flow rate of 1.7 mL/min. GC/MS analyses were carried out under the same conditions (column, oven,

temperature, flow rate of the carrier gas) with GC by Agilent Technologies 6890N Network system gas chromatograph equipped with an Agilent Technologies 5973 inert Mass Selective Detector (Agilent G3180B Two-Ways Splitters with Makeup gas) in the electron impact mode (70eV). The mass range was between m/z 10 and 550. The column, temperature programme and injection were performed as described above. Injection was carried out automatic mode. Wiley8.L and Nist08 were used for library search. Relative percentages were calculated. For quantification purposes area percent reports obtained by FID were used.

RESULTS AND DISCUSSION

Analyses of the hydrodistilled oil were performed on GC-MS systems. Chemical composition, retention indices (RI) and percentage (%) composition of the essential oil of *Scutellaria orientalis* subsp. *virens* is given in Table 1.

The amount of oil calculated per weight of the dried plant material (v/w) was 0.04 %. The numbers of the identified compounds are 33 and representing 89.29% of the oil. β-Caryophyllene (22.08%), γ-Cadinene (19.92%), Camphene (6.00%) and Calarene (5.94%) are the major components of the essential oil.

A single study about the essential oil composition of *Scutellaria orientalis* subsp. *virens* was given from Iran and twenty-two compounds, representing 95.6% of the oil were determined. Germacrene D (16.5%), terpinolene (15.6%) and β-caryophyllene (13.4%) are established as the main compounds in previous study (Delnavazi et al., 2014).

Comparing the previous data with the chemical composition of the oil, it becomes evident that β-caryophyllene, caryophyllene, γ-cadinene, germacrene D, terpinolene, camphene and calarene are the major common components of the *Scutellaria orientalis* subsp. *virens* that grown from different localities (Table 2).

Table 1. Chemical composition, Retention indices (RI), percentage (%) composition of the essential oil of *Scutellaria orientalis* subsp. *virens*.

No	Compound	RI	Composition (%)
1.	Camphene	1258	6.00
2.	α -Copaene	1270	0.40
3.	Bornyl acetate	1284	0.77
4.	β -Caryophyllene	1309	22.08
5.	α -Amorphene	1323	2.26
6.	Germacrene D	1324	0.31
7.	Isoborneol	1326	1.95
8.	Calarene	1337	5.94
9.	γ -Cadinene	1362	19.92
10.	Valencene	1364	1.45
11.	Alloaromadendrene	1369	4.75
12.	delta-cadinene	1372	3.62
13.	1,2,3,4,6,8alpha-Hexahydro-1-isopropyl-4,7-dimethylnaphthalene	1385	0.20
14.	Aromadendrene	1389	0.24
15.	Calamenene	1408	0.31
16.	β -Ionone	1466	0.59
17.	1,2,3,4-Tetrahydro-1,5,7-trimethylnaphthalene	1488	0.29
18.	1,7,7-Trimethyl-2-vinylbicyclo[2.2.1]hept-2-ene	1510	0.41
19.	Caryophyllene oxide	1524	4.96
20.	β -Damascone	1568	1.01
21.	α -Gurjunene	1584	0.40
22.	Spathulenol	1642	3.99
23.	Valeranone	1650	0.89
24.	T-muurolol	1718	0.36
25.	Torreyol	1732	0.15
26.	α -Cadinol	1791	1.28
27.	Decanoic acid	1824	0.20
28.	Calamenene	1887	0.56
29.	Cuparene	1899	1.25
30.	Caryophyllenol II	1977	0.83
31.	Phytol	2453	1.38
32.	13-Epitorulosol	2513	0.30
33.	Pentadecanoic acid	2741	0.24
Total			89.29

Table 2. Comparison of the chemotypes of the essential oil of *Scutellaria orientalis* subsp. *virens*.

Locality	Major components		References
	Compound	Composition (%)	
Malatya, TURKEY	β -Caryophyllene	22.08	Current study
	γ -Cadinene	19.92	
	Camphene	6.00	
	Calarene	5.94	
Shabestar County, IRAN	germacrene D	16.5	Delnavazi et al. 2014
	terpinolene	15.6	
	β -caryophyllene	13.4	

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