

Composition and Antimicrobial Activity of Essential Oil of *Ziziphora tenuir*, Population Iran

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Abstract:

The volatile constituents of *Ziziphora tenuir* (Labiatae) from three different regions of Iran, were studied by GLC and GC-MS. The major component was Pulegone.

The composition of the essential oil from three different regions were compared and antimicrobial activity of the essential oil was studied.

key words: *Ziziphora tenuir*, Essential oil, Labiatae, Antimicrobial

Introduction:

Ziziphora tenuir is widely distributed in Iran. The constituents of the essential oil of *Ziziphora tenuir* of Turkey has been reported (2). In this work the constituents of the volatile oil of *Ziziphora tenuir* population Iran is reported.

Materials and Methods:

Plant materials

The plant materials were collected in June 1995 from kerman, Ghazwin and mashhad with completely different climates. The plant was identified by Amin, G. and deposited in the Herbarium of the Faculty of Pharmacy, Tehran Medical Sciences University. The aerial parts

were air dried in the shade and hydrodistilled by using a cleavenger type apparatus. The yields of oils were (V/W) 2% for Kerman (sample A), 1.2% for Ghazwin (sample B) and 1.5% for mashhad (sample C).

Analytical Techniques

GC: Capillary GC was carried out using a Varian GC 3600 chromatograph with DB1 column (fused silica 60 m x 0.32 mm i.d.) and flame ionization detector, temperature programming was performed from 60° C to 230° C at 3°/min and finally isothermal for 5 minutes, Injector temperature 240° C.

GC-MS : A Varian GC 3400 was interfaced with a quadropole mass spectrometer (Finnigan Mat TSQ 70). A fused silica capillary column (DB1 60 m x 0.32 mm i.d.) was used as in the GC analysis. Kovats indices were calculated by using retention times of N-alkanes (C₈-C₁₈) that were injected after the essential oil at the same temperature and conditions (3,4). Identification of the components of essential oil was carried out by Kovats indices and MS spectra (5-8).

Antimicrobial Testing

The antimicrobial effects of the essential oil were tested by the disc diffusion method (9,10). The following microorganisms were used in this experiment.

Staphylococcus aureus (PTCC 1337), *Bacillus subtilis* (PTCC 1023), *Klebsiella pneumoniae* (PTCC 1053), *Proteus mirabilis* (PTCC 1076), *Candida albicans* (PTCC 5027) and *Aspergillus niger* (PTCC 5013).

Paper discs with a diameter of 6 mm containing 0.5, 1, 2 and 5 mg of the samples to be assayed were deposited on the surface of the seeded nutrient agar (for antibacterial assay) and sabouraud Dextrose agar (for antifungal assay) in Petri dishes. The bacterial Petri dishes were incubated for 24 h at 37° and fungal Petri dishes were incubated for 24-28 h at 20 C . The essential oil of *Ziziphora tenuifolia* from Kerman has been selected and antimicrobial activity of the sample has been determined.

Results and Discussions:

Table 1 shows the percentage composition of essential oil of *Ziziphora tenuifolia* from three different regions. The constituents of the essential oil depended on the region of the growth. Menthone, isomenthone, menthol and isomenthol were four components of the essential oil in about 17% and 24% in Kerman and Mashhad respectively. These compounds were not

detected in essential oil of Ghazwin and Turkey (2). Several compounds were only observed in one or two regions while Pulegone was the main component of all.

Table 2 shows the antimicrobial activity of the essential oil of *Ziziphora tenuifolia* of population Kerman.

About 0.5-2 mg of the essential oil per paper disc had antibacterial and antifungal activities.

It was shown that pulegone has pronounced activity against fungi and bacteria (11). Therefore, the antimicrobial activity of the essential oil of *Ziziphora tenuifolia* is mostly due to pulegone.

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Table 1. The constituents of the essential oil of *Ziziphora tenuir* in three different regions

Peak No.	Compound	<i>Ziziphora tenuir</i>		
		Kerman A (%)	Ghazwin B (%)	Mashhad C (%)
1	Benzaldehyde	0.17	0.08	-
2	α -Pinene	0.34	0.44	0.08
3	Camphene	-	-	0.08
4	1-Octen-3-ol	0.02	-	0.03
5	Sabinene	-	0.37	0.18
6	3-Octanol	-	-	0.08
7	β -Pinene	0.78	0.65	1.40
8	Myrcene	-	0.32	-
9	ρ -Cymene	1.23	-	0.39
10	1,8-Cineol	6.02	0.76	5.78
11	Limonene	0.33	4.82	0.25
12	γ -Terpinene	-	0.19	0.12
13	trans-Sabinen hydrate	-	-	0.04
14	ρ -Mentha-2,8-diene	-	-	0.18
15	Linalool	0.03	-	0.05
16	Unknown MW=154	-	0.95	-
17	Menthone	4.38	-	8.86
18	Isopulegone	-	0.28	-
19	Isomenthone	4.02	-	11.11
20	3,7-dimethyl oct 1,5,7-triene-3-ol	-	-	1.05
21	Borneol	-	-	0.28
22	4-Terpineol	0.73	-	0.02
23	Menthol	5.78	-	1.48
24	Isomenthol	3.30	-	2.81
25	Pulegone	58.10	87.80	53.25
26	Piperitone	0.36	0.04	1.66
27	Unknown MW=154	1.42	-	-
28	Isopiperitone	-	-	0.19
29	Thymol	0.08	-	0.16
30	Carvacrol	3.01	-	0.04
31	Isomenthyl Acetate	0.25	-	-
32	5-Undecene 4-one	0.29	-	-
33	Piperitenone	4.20	0.80	8.68
34	Unknown MW=166	2.86	0.62	-
35	Unknown MW=166	1.02	-	-
36	cis-jasmone	-	-	0.02
37	β -Bourbonene	-	-	0.16
38	β -Caryophyllene	-	0.51	-
39	γ -Murulene	-	-	0.02
40	δ -Cadinene	-	0.23	-
41	Spathulenol	-	0.53	-
42	Viridiflorol	0.95	-	-

Table 2. Antimicrobial activity of *Ziziphora tenuir*

Organism	mg/paper disc	zone of inhibition in mm
Staphylococcus aureus (PTCC 1337)	0.5	7
	1	7
	2	8
	5	9 8 ^a
Bacillus subtilis (PTCC 1023)	0.5	-
	1	7
	2	8
	5	10 25 ^a
Proteus mirabilis (PTCC 1076)	0.5	8
	1	8.5
	2	9
	5	10 25 ^a
Escherichia coli (Endemic)	0.5	-
	1	8
	2	9
	5	12 18 ^a
Klebsiella pneumoniae (PTCC 1053)	0.5	-
	1	-
	2	7
	5	9 7 ^a
Aspergillus niger (PTCC 5013)	0.5	11
	1	12
	2	13
	5	18 18 ^b
Candida albicans (PTCC 5027)	0.5	-
	1	8
	2	9
	5	16 33 ^b

^a Gentamicin 10 mg/paper disk was used as reference

^b ketoconazol 10 mg/ paper disk was used as reference