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Evaluation Of Phytochemical Composition Of Opsicarpium insignis Mozaff. From Iran By Nano Scale Injection Techniques

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Abstract: The hydrodistilled oil from the aerial part of *Opsicarpium insignis* Mozaff., which is endemic to Iran, was analyzed by GC and GC/MS at full flowering stage. The amount of the sample injected was 1.0 nL (diluted 1.0 µL of sample in 1000 ml of *n*-pentane, v/v). Caryophyllene oxide (39.91%), Limonene (32.36%), trans-Caryophyllene (7.62%), Neo-iso-Menthol (4.04%), and β-Pinen (3.05%) were the main components among the 30 constituents characterized in the oil of *O. insignis* Mozaff., representing 95.62% of the total components detected.

Key words: Phytochemical Composition, *Opsicarpium insignis* Mozaff., Nano Scale Injection Techniques, Iran.

Introduction:

Essential oils are complex natural mixtures of volatile secondary metabolites, isolated from plants by hydro-or steam distillation and by expression. For centuries essential oils have been isolated from different parts of plants and also are used for fragrant and biological activities. Various essential oils produce pharmacological effects, demonstrating anti-inflammatory, antioxidant and anticancerogenic properties. Others are biocides against a broad range of organisms such as bacteria, fungi, viruses, protozoa, insects and plants[1].

The genus *Opsicarpium* is a plant belonging to the Umbelliferae family. Umbelliferae, a family of about 300 genera and 3000 species is cosmopolitan in distribution, chiefly in north temperate regions[3,4]. Plants of this

family are grassy, permanent, biennial or annual and mostly grow in north hemisphere; also more species of this family distributed in Mediterranean areas, Turkey and Iran[5,6]. This family is of considerable economic importance for food, flavoring and ornamental plants[7]. These plants are known to accumulate flavonoids mainly in the form of flavones and flavonols[8].

Opsicarpium insignis Mozaff. is an endemic plant in Iran, also it is dispersed around some parts of the Zagros Mountains including Kurdestan and Lorestan province. *O. insignis* Mozaff. is annual with 100-150 cm height and5–8 mm broad[9].
Literature survey revealed that the essential oil of aerial parts of this plant from Iran has not been considered before. On the other hand, in this experiment the percentage of chemical composition was obtained by nano scale injection.

Materials and Methods

Plant materials and oil isolation: The aerial parts of *O. insignis* Mozaff. were collected from west of Iran, Saral zone. Saral is located in Kurdestan province, north-west of Sanandaj city (35° 33′ 41/1″ N 46° 48′ 41/0″ E, 2346 m above sea level). The oil was obtained by hydrodistillation using a Clevenger-type apparatus for 3 h. The distillated oil was dried over anhydrous sodium sulfate and stored at 4 °C until analyzed.

Gas chromatography: GC analysis was conducted using a Varian CP-3800 instrument equipped with a capillary VF-5 fused silica column (30 m × 0.25 mm i.d., film thickness 0.25 µm). Helium was used as the carrier gas at the constant flow of 1.1 ml/min; splitless. The oven temperature was held at 60 °C for 1 min, then programmed to 250 °C at a rate of 3 °C/min, and held for 10 min. The injector and detector (FID) temperatures were kept at 250 and 280 °C, respectively. The amount of the sample injected was 1.0 nL (diluted 1.0 µL of sample in 1000 ml of n-pentane, v/v).

Gas chromatography–mass spectrometry: A GC/MS analysis was performed on a Varian CP-3800 GC coupled with Varian 4000 (Ion trap) Mass system. The operating conditions were the same conditions as described above but the carrier gas was Helium Mass spectra were taken at 70 ev. Mass range was from m/z 35-400 amu.

Identification of the compounds: The chemical composition of the essential oils were identified by calculation of their retention indices under temperature-programmed conditions for *n-alkanes* (C6–C24) and the oil on a VF-5 column under the same chromatographic conditions. The compounds were identified by comparison of their mass spectra with those of the internal reference mass spectra library (Wiley 7) or with authentic compounds and confirmed by comparison of their retention indices with authentic compounds or with those reported in the literature[10]. For quantification purpose, relative area percentages obtained by FID were used without the use of correction factors.

Results and discussion:

Essential oil yield was 0.2 ٪ (w/w*)* based on the dry weight of the plant sample and color of the oil was yellowish. The chemical compositions of essential oil of *O. insignis* Mozaff. From Iran are indicated in Table 1.

In the essential oil obtained of the aerial parts of *O. insignis* Mozaff., we identified 30 compounds representing 95.62% of the total oil, as follows: 4 monoterpenes hydrocarbons, 11 oxygenated monoterpenes, 10 sesquiterpenes hydrocarbons and 5 oxygenated sesquiterpenes. Oxygenated sesquiterpenes compounds were the major component (43.08%) followed by monoterpenes hydrocarbons (36.73%), sesquiterpenes hydrocarbons (9.56%), and oxygenated monoterpenes (6.24%). The dominant chemical compositions found were Caryophyllene oxide (39.91%), Limonene (32.36%), trans-Caryophyllene (7.62%), Neo-iso-Menthol (4.04%), and β-Pinen (3.05%).

Table 1. Percentage composition of the essential oil of the aerial parts of *O. insignis* Mozaff. from Iran.

No.	Compound[a]	RI[b]	%
1	α-Pinene	933	0.09
2	β- Pinene	980	3.05
3	Myrcene	988	1.24
4	Limonene	1033	32.36
5	Cis- Limonene oxide	1139	0.18
6	Cis-Sabinol	1145	0.09
7	Menthol	1173	0.08
8	Neo-iso-Menthol	1183	4.04
9	Myrtenol	1200	0.18
10	trans-Carveol	1222	0.19
11	cis-Carveol	1234	0.06
12	Carvone	1246	0.25
13	4-Ethyl-2,6-xylenol	1279	0.26
14	Neo-Menthyl acetate	1287	0.90
15	Thymol	1289	0.03
16	α-Copaene	1376	0.13
17	β-Bourbonene	1385	0.05
18	trans-Caryophyllene	1424	7.62
19	Cis-β-Farnesene	1451	0.05
20	α-Humulene	1459	0.39
21	Germacrene-D	1484	0.79
22	δ-Selinene	1492	0.08
23	Bicyclogermacrene	1498	0.21
24	δ-Cadinene	1522	0.12
25	Cis-Nerolidol	1536	0.12
26	Germacrene-B	1569	0.12
27	Caryophyllene xide	1600	39.91
28	Veridiflorol	1608	0.84
29	Cis-α-Santalol	1678	0.48
30	(Z,E)-Farnesol	1691	1.74
Total			95.62

[a] Compounds listed in order of their RI.
[b] RI (retention index) measured relative to n-alkanes on the capillary VF-5 fused silica column.
%, Relative percentage obtained from peak area.

In this paper, we show some important of biological properties and application of main components from *O. insignis* Mozaff. essential oil:

***β*-Pinene:** is used as antifungual, insecticides and polymer industries, and as a fragrance material in household perfumery.

Limonene: is employed as component of artificial essential oils, and as fragrance material for perfuming household products.

Neo-iso-Menthol: is employed as antibacterial, antiseptic, anti-inflammatory and antipyretic. Also iso-menthol is widely used in many industries such as pharmaceutical, beverage, candies or gum, tobacco and insecticide.

Caryophyllene oxide: is applied as antibacterial and antifungual.

trans-Caryophyllene: is well-known for its anti-inflammatory and local anaesthetic activities. This compound is also used in spice blends, soaps, detergents and creams, and is widely used in food products and beverages

Literature survey indicated that there is no report on the chemical composition of *O. insignis* Mozaff. This work is therefore the first report on the essential oil from these species. Further studies are needed to obtain more information regarding antioxidants, antibacterial and antifungal activity of this oil.

Conclusion:

In conclusion, the essential oils rich in oxygenated sesquiterpenes and monoterpenes hydrocarbons present highly appreciated in the pharmaceutical and cosmetic industry. According to obtained chemical composition contents, we suggest that this plant should be grown in cultural conditions as the next step.

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