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ORIGINAL ARTICLE

Chemical Composition of the Essential Oils of *Origanum vulgare*

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ABSTRACT
The essential oils of Origanum vulgare (Lamiaceae) leaves were prepared by hydrodistillation and analyzed by GC/MS. Thirty-three compounds were identified in leaves essential oils representing 91.92% of total oils. The major components were limonene (3.54%), carvacrol (12.31%), 1.8-cineole (5.41%), thymol (25.3%), a-pinene (10.3%), camphene (4.56%), bisabolol (6.56%), camphor (8.65%) and borneol (3.4%). The amounts of monoterpens and sesquiterpenes were found nearly to be equal in oils of plant.
Keywords: *Origanum vulgare, Lamiaceae, Essential oil,GC/MS.*

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INTRODUCTION

Medicinal plants are part of human society to combat diseases, since of beginning of civilization [1]. Essential oils (EOs) are aromatic oily liquids obtained from various medicinal plants parts. Essential oils have many therapeutic and they aid the distribution of drugs and antiseptics [2]. *Origanum vulgare* is the common oregano that thrives naturally in almost every region of Iran. *Origanum* oil, used as food-flavouring agent, possesses a broad spectrum of antimicrobial activity due, at least in part, to its high content of phenolic derivatives, such as carvacrol and thymol [3]. The present work was undertaken to determine the chemical composition of essential oils from *origanum* growing wild in several locations of Ilam, Iran.

MATERIALS AND METHODS

Plant material and oil isolation

The plant materials were collected from the mountains in the city of Ilam-Iran in 2012- 2013. The *Origanum vulgare* leaves were ground and the resulting powder was subjected to hydrodistillation for 3 hours in an all glass Clevenger-type apparatus according to the method recommended by the European Pharmacopoeia [4]. The obtained essential oils were dried over anhydrous sodium sulphate and after filtration, stored at +4 ºC until tested and analysed.

Essential oil analysis

The GC/MS analyses were executed on a Hewlett–Packard 5973N gas chromatograph equipped with a column HP-5MS (30 m length × 0.25 mm i.d., film thickness 0.25 µm) coupled with a Hewlett–Packard 5973N mass spectrometer. The column temperature was programmed at 50 ºC as an initial temperature, holding for 6 min, with 3 ºC increases per minute to the temperature of 240 ºC, followed by a temperature enhancement of 15 ºC per minute up to 300 ºC, holding at the mentioned temperature for 3 min. Injector port temperature was 290 ºC and helium used as carrier gas at a flow rate 1.5 ml/min. Ionization voltage of mass spectrometer in the EI-mode was equal to 70 eV and ionization source temperature was 250 ºC. Linear retention indices for all components were determined by coinjection of the samples with a solution containing homologous series of C8-C22 *n*-alkanes and comparing them and their mass spectra with those of authentic samples or with available library data of the GC/MS system (WILEY 2001 data software) and Adams libraries spectra [5].

RESULT AND DISCUSSION

The GC/MS of oil shows the presence of 33 compounds and 91.92% of essential oil has been identified (Table 1). The yield of essential oil obtained from leaves of plants was 1.3% (v/w). The major constituents of oil were limonene (3.54%), carvacrol (12.31%), 1.8-cineole (5.41%), thymol (25.3%), a-pinene (10.3%), camphene (4.56%), bisabolol (6.56%), camphor (8.65%) and borneol (3.4%). The oxygenated monoterpenes and sesquiterpene hydrocarbons found in the oil as minor components. The phytochemistry revealed that this leaves had compositions similar to those of other *Origanum vulgare* essential oils analyzed by Derwich et al. [6,7], which the major compounds was carvacrol, thymol, y-terpinene and p-cymene representing 76.62 % of the total oil. Variations in the composition of the volatile oils extracted from *Origanum* have been the topic in the reports of several researchers. In previous studies, it has been demonstrated that the chemical composition of the essential oil of *Origanum vulgare* L. varies with geographical location of the collection site, climate and other ecological factors [8,9]. In Mediterranean countries, *O. vulgare* var. *creticum* was found to contain essential oil with a varying percentages of carvacrol ranging from 3% to 68% [10]. Afsharypour et al. [11] reported The *Origanum vulgare* viride growing in Iran, produced linalyl acetate-β- caryophyllene-sabinene chemotype of essential oil. It has been found that *Origanum vulgare* grown in a Mediterranean climate contains higher amount of phenols, whereas *Origanum vulgare* from the inland contains a higher amount of terpenoid alcohols [12,13]. In the analysis of the volatile oil of the dried leaves of *S.triloba*, bicyclic oxygenated monoterpenes represented by 1,8-cineol (45.16%), camphor (11.53%), and γ-terpineol (4.40%), together with the bicyclic hydrocarbon monoterpenes α-pinene (3.35%) and β-pinene (8.98%), were characterized as the major components [14]. In conclusion, it is worthwhile to screen the commonly used plants from the local flora for different biological activities because they might present a new alternative source for possible bioactive substances.

Table 1. Chemical composition of essential oils *Origanum vulgare*

	Components	%
1	Terpinen-4-ol	1.3
2	Sabinene	1.45
3	Verbenol	1.36
4	Limonene	3.54
5	Carvacrol	12.31
6	1.8-Cineole	5.41
7	Linalool	1.4
8	Thymol	25.3
9	y-Terpinene	0.87
10	a-Pinene	10.3
11	Camphene	4.56
12	Bisabolol	6.56
13	Isoaromadendrene epoxide	0.34
14	Camphor	8.65
15	Hexahydrofarnesyl acetone	0.4
16	Tetradecanoic acid	0.36
17	Calarene	0.11
18	y-Terpineol	0.36
19	Germacrene-D	0.06
20	Cadinene	0.11
21	Cubenol	0.34
22	Carvone	0.25
23	1-methoxymethyl-Decalin	0.08
24	Bornyl acetate	0.78
25	b-pinene	1.11
26	myrcene	0.09
27	a-phelandrene	0.07
28	para-cymene	0.34
29	a-terpinolene	0.45
30	chrysanthenone	0.07
31	b-caryophyllene	0.16
32	borneol	3.4
33	geraniol	0.03
	Total	91.92

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