Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 3 (5) April 2014: 138-139

Online ISSN 2277-1808
Journal's URL:http://www.bepls.com
CODEN: BEPLAD
Global Impact Factor 0.533
Universal Impact Factor 0.9804

ORIGINAL ARTICLE

Composition of Essential Oil of *Artemisia douglasiana*

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ABSTRACT
The hydrodistillation essential oil from Artemisia douglasiana growing in Iran was analyzed by GC/MS. In all 10 compounds were identified; camphene (8.45%), 1,8-cineole (10.56%), artemisia ketone (5.78%), artemisia alcohol (6.77%), a-thujone (3.44%), camphor (20.54%), terpinen-4-ol (2.43%), myrtenal (1.45%), p-cymene (7.86%) and carvacrol (22.87%) were the main components of the oil.
Key Words: *Artemisia douglasiana, Asteraceae, Essential oil, GC/MS.*

Received 24/01/2014 Accepted 10/03/2014

INTRODUCTION

Artemisia L. is a genus of small herbs and shrubs found in northern temperate regions. It belongs to the important family Compositae (Asteraceae), one of the most numerous plant groupings, which comprises about 1,000 genera and over 20,000 species. The 500 species of *Artemisia* are mainly found in Asia, Europe and North America. They are mostly perennial herbs dominating the vast steppe communities of Asia. *Artemisia douglasiana* is a common perennial herb and prefers dry, partially shaded streamsides or riverbanks on most geologic formations. Numerous reports on essential oils composition of different *Artemisia* species, specially on those used in flavour industry and in medication, have been published [1]. The main objectives of the present study were to evaluate of the essential oil from *Artemisia douglasiana* aerial parts.

MATERIALS AND METHODS

Plant material and oil isolation

The plant materials were purchased from of Tehran-Iran in 2012- 2013. The *Artemisia douglasiana* aerial parts such as stem, flowers and 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 [2]. 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 lm) 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 [3].

RESULT AND DISCUSSION

Chemical composition of essential oil

The chemical compositions of *Artemisia douglasiana* essential oil are shown in Table 1. 10 compounds representing 90.15 % of *Artemisia douglasiana* essential oil were identified. The major organic compounds detected in the oils, were camphene (8.45%), 1,8-cineole (10.56%), artemisia ketone (5.78%), artemisia alcohol (6.77%), a-thujone (3.44%), camphor (20.54%), terpinen-4-ol (2.43%), myrtenal (1.45%), p-cymene (7.86%) and carvacrol (22.87%). Setzer *et al.,* [4] reported camphor (28.98%) as the main constituent of the *Artemisia douglasiana* essential oil. Analysis of the chemical composition of *Artemisia absinthium* oils extracted from plants grown in USA showed *b*-thujone (17.5–42.3%) and C-sabinyl acetate (15.1-53.4%) as the main components [5]. Previous research showed that *a*-pinene (10.2%), 1,8-cineole (10.1%), artemisia ketone (11.4%) and camphor (24.6%) were the main components of the essential oil of *Artemisia biennis* grown in Iran [6]. Previous research showed that bornane derivatives (camphor, borneol and bornyl acetate) and 1,8-cineole are major characteristic components of many species of Artemisia genus, such as: *Artemisia annua*, *Artemisia vulgares*, *Artemisia diffusa*, *Artemisia santonicum*, *Artemisia spicigera*, *Artemisia afra*, *Artemisia asiatica*, *Artemisia austriaca* and *Artemisia pedemontana* [7,8]. Borneol (2.3-8.1%) and bornyl acetate (0.1-2.8%) were also identified in the four *Artemisia* oils previously mentioned. In Iran, A. sieberi is used in traditional folk remedies for its antiseptic, analgesic (pain-relieving) and reducing-cough properties [9]. Davanone has been found to be the major constituent in some populations of *Artemisia douglasiana* and *Artemisia herba-alba* from Morocco [10]. It has been reported that the chemical compositions of the essential oil are highly influenced by climatic conditions and geographical factors.

Table 1. Composition of the essential oil of *Artemisia douglasiana*

Peak No.	Component	Retention Index	%
1.	Camphene	950	8.45
2.	1,8-Cineole	1027	10.56
3.	Artemisia ketone	1069	5.78
4.	Artemisia alcohol	1078	6.77
5.	a-Thujone	1100	3.44
6.	Camphor	1140	20.54
7.	Terpinen-4-ol	1175	2.43
8.	Myrtenal	1190	1.45
9.	p-Cymene	1264	7.86
10.	Carvacrol	1308	22.87
	Total		90.15

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Citation of this article

Mohsen Kazemi, Composition of Essential Oil of *Artemisia douglasiana*.Bull. Env. Pharmacol. Life Sci., Vol 3 (5) April 2014: 138-139