



Comparison of chemical composition of essential oil and n-hexane extracts of stachys *Lavandulifolia vahl*

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Received: 19th June, 2010 ; Accepted: 29th June, 2010

ABSTRACT

The water distilled essential oil and *n*-hexane extract of *Stachys lavandulifolia* (family: Lamiaceae) growing in Ardabil, north-west of Iran, were analyzed by GC and GC/MS. The yields were: 0.2% and 0.7% (V/W) for essential oil and *n*-hexane extract, respectively. Twenty-six compounds representing 72.0% of the distilled oil of *S. lavandulifolia* were identified, among them caryophyllene oxid (7.4%), α -pinene (7.0%), β -Phellandrene (6.3%), germacrene-D (5.6%), spathulenol (5.0%), linalool (4.7%) and trans- β -farnesene (4.5%) were the major constituents. The extract was characterized by higher amount of 9,12,15-octadecatrienoic methyl ester (34.0%), eicosane (10.7%), palmitic acid (9.9%) and nonacosane (7.5%). Twelve components, accounting for 82.7 % of the total oil, were detected in the extract. The oil obtained by hydrodistillation method consists mainly of aliphatic oxygenated and sesquiterpene constituents, whereas the extract contains mainly aliphatic ester compounds. © 2010 Trade Science Inc. - INDIA

KEYWORDS

Stachys lavandulifolia;
S.lavandulifolia;
 α -pinene;
 β -Phellandrene;
Germacrene-D;
Spathulenol;
Linalool.

INTRODUCTION

In the flora of Iran, the genus *Stachys* is represented by thirty-one species. *Stachys lavandulifolia* is grown in many parts of Iran, Iraq and Anatolia^[1]. The plant is used as the herbal tea in gastrointestinal disorders^[2]. Hydroalcoholic extract of the aerial parts of *S. inflata* shows potent anti-inflammatory activity in rat. The methanolic extract of the tuber of *S. sieboldii* has anti-anoxia action in mice^[3,4]. Ramezani et al. reported spathulenol and caryophyllene oxide as the main constituents of *S. lavandulifolia*^[5]. In the present study, a sample of *S. lavandulifolia* with different chemical composition has been reported.

RESULTS AND DISCUSSIONS

Extraction of essential oil

Plant materials were dried at room temperature in the shade. The aerial parts (100 g) were subjected to hydrodistillation for 4 hrs using a Clevenger-type apparatus. The yield of the oil was 0.2 % (V/W). The essential oil was dried over anhydrous sodium sulfate (Na_2SO_4) and stored at 4-5°C.

Extraction of plant sample

The dried aerial parts of powdered plant (50 g) were extracted, with *n*-hexane (1:10) using a Soxhlet apparatus. The extract was concentrated using a rotary

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TABLE 1 : Chemical composition of essential oil from *Stachys lavandulifolia*

No.	Compound	KI	%
1	α -Pinene	939	7.0
2	β -Pinene	980	1.5
3	β -Myrcene	991	3.2
4	β -Phellandren	1030	6.3
5	1,3,6-octatriene,3,7-dimethyl-(E)	1032	0.9
6	δ -3-Carene	1033	1.0
7	Linalool	1097	4.7
8	Terpinene-4-ol	1176	1.0
9	α -Copaene	1377	1.7
10	β -panasinsen	1383	1.5
11	β -Damascenone	1385	1.0
12	Linalyl propionate	1392	1.8
13	Italicene	1406	1.2
14	trans- β - Farnesene	1457	4.5
15	Germacrene- D	1482	5.6
16	β - Selinene	1490	2.3
17	Bicyclogermacrene	1499	1.4
18	β -bisabolene	1506	0.7
19	δ -Cadinene	1523	3.6
20	Spathulenol	1576	5.0
21	Caryophyllene oxid	1583	7.4
22	τ -Muurolol	1643	1.8
23	α -Cadinol	1654	2.1
24	Valeranone	1675	1.8
25	α -Bisabolol	1685	1.0
26	Hexadecanoic acid	1897	2.0
27	Total	--	72%

evaporator at a maximum temperature of 50°C in vacuum conditions. The yield of the extract was 0.7 % (V/W) and it was dried over anhydrous sodium sulfate and stored at 4-5°C until GC and GC/MS analysis.

The results obtained in the analyses of the oil of *S.lavandulifolia* and n-hexane extract are listed in TABLE 1 and 2, in which the percentage of components are given. Twenty-six compounds were identified, representing 72.0% of the essential oil, in which the major components were caryophyllene oxid (7.4%), α -pinene (7.0%), β -phellandrene (6.3%), germacrene-D (5.6%), spathulenol (5.0%), linalool (4.7%) and trans- β -farnesene (4.5%). The hexane extract contains twelve components and were characterized by 9, 12, 15-octadecatrienoic methyl ester (34.0%), eicosane (10.7%), palmitic acid (9.9%) and nonacosane (7.5%)

TABLE 2 : Chemical composition of n-hexane extract from *S. lavandulifolia*

No.	Compound Name	Percentage
1	9,12,15-Octadecatrienoic methyl ester	34.0
2	Palmitic acid	9.9
3	Heptacosane	2.5
4	Nonacosane	7.5
5	Eicosane	10.7
6	Vitamin E	3.2
7	Hexatriacontane	5.0
8	Gamma-sitosterol	3.9
9	Phytol	1.5
10	Squalene	1.4
11	Stigmasterol	1.9
12	Neophytadiene	1.2
Total		82.7%

as the major constituents (TABLE 2). The main components of the oils of *S. aegyptica* (α -pinene) and *S. glutinosa* (α -pinene and β -phellandrene) were presented as the major components of the *S.lavandulifolia* oil^[6]. β -Pinene, one of the main components of *S. recta* and *S.balansae* oils, was present at an amount of 8.4% in *S.lavandulifolia* oil^[7]. It should be noted that the components of n-hexane extract were reported for first time.

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