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The Study of Essential oil of *Hymenocrater longiflorus* Benth Growing in Paveh

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A B S T R A C T

The genus Hymenocrater, belong to the Lamiaceae family, consist of 21 species throughout the world. In Iran, about 9 species are present, of which some are endemic. Plants belonging to these genuses are pharmacologically active and have been used in folk medicine all around the world. The aim of the present study was to detect the essential oils composition of *Hymenocrater longiflorus* Benth. collected from Paveh, Kermanshah province. Plant sample was dried in shade condition and the essential oil of the plant obtained by hydrodistillation by Clevenger type apparatus was analyzed by GC/MS. Yield of essential oil was (1.5 % v/w). The major components of the oil of *H. longiflorus* Benth were Hedycaryol (22.2), α-Cadinol (20.43), β-Bourbonene (5.76%), α-Terpineol (4.95%), Eudesmol <7-Epi-> (4.84%), β-Bourbonene (4.69%), Caryophylene oxide (4.32%) and Geijerene (4.08%), Caryophelen (2.99), Sabinene (2.6%), 1,8-Cineole (2.58%), δ-Amorphene (2.58%), δ-Caddinene (2.24%) and α-Pinene (2.07%) were the main compounds with the greatest content.

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Introdoction

Hymenocrater genus (Lamiaceae) contains of over 21 species in the world with nine species in Iran [1-3].
This herb was firstly nominated by G. Bentham in1848. The local name of *H. longiflorus*, is *Soor-Halale* (*Sǒǒr-HΛLΛLE*). The other names of this herb are: *SoorSanduo* and *Gole Arvaneh-Avarmani.* The *H. longiflorus* was utilizedas a medicinal herb in local and traditional medicine of Kermanshah. Aerial parts of this herb in crude or baked form was utilized as an anti-inflammatory, sedative,anti-skinallergic reaction (for skin diseases and insect bite) in folk medicine. Recently, this plant has drawn more attention due to the antimicrobial, antifungal and antioxidative effects [4, 5].
Taherpour et al.,[5] reported that, α-Pinene, trans-Caryophyllene and β-Eudesmol represent the major constituents of the essential oil aerial parts of *H. longiflorus* Benth. In another study by Ahmadi et al.,[4] δ-Cadinol (18.49%), α-Pinene (10.16%), p-Menth-1-en-8-ol (9.82%), Hedycaryol (6.42%), β-Eudesmol (4.56%), Spathulenol (4.14%), δ-Cadenene (3.02%), Caryophyllene oxide (2.81%), were reported to be the major components aerial parts in *H. longiflorus* essential oil.
In the present study, we report essential oil content and composition of *H. longiflorus* Benth collected from Paveh, Kermanshah, Iran.

Materials and methods

Plant material

*H. longiflorus*was collected in May 2012 at full flowering stage from Paveh (1530 m, 35° 3′ 0″N, 46° 16′ 12″E), Kermanshah province, Iran. The taxonomic identification of plant materials was confirmed by a senior plant taxonomist, Dr. N. Jalilian, in Kermanshah Agriculture and Natural Resource Research Center, Iran.
The dry plant material (40 g) were ground into small pieces and subjected to hydrodistillation (HD) using a Clevenger-type apparatus (3 h). The obtained essential oils were dried over anhydrous sodium sulfate and stored at 4°C in a sealed brown vial until analysis with GC and GC–MS.

GC and GC- MS Analyses

GC analysis was carried out using a Hewlett-Packard 6890 with HP-5 capillary column [phenyl methyl siloxane; 25 m x 0.25 mm x 0.25 μm]. The oven temperature was programmed as following: 60 to 240 °C at 4 °C/min increment rate; injector temperature, 250 °C; detector temperature 260 °C; carrier gas He (1.5ml/min); split ratio 1:25.
GC-MS analyses were carried out applying a Hewlett-Packard 6859 with a quadrupol detector, on a HP-5 column (see GC), operating at 70 ev ionization energy, and using temperature program and carrier gas as mentioned above. Retention indices were calculated by using retention times of n-alkanes that were injected after the oil at the same chromatographic conditions. The retention indices for all components were determined according to the Van den Dool's method using n-alkanes as standard [6]. The compounds were identified by comparison of relative retention indices (RRI, DB-5) with those reported in the literature [7] and by comparison of their mass spectra with the Wiley library [8]. The quantification of the oil was based on one analysis.

Results and discussion

Yield of essential oil was found 1.5%v/w to dried herb. About 30 compounds of the oil were determined. GC/MS analyses revealed that the major compounds of the oil (%) were Hedycaryol (22.2%), α-Cadinol (20.43), Germacrene D (5.76%), α-Terpineol (4.95%), Eudesmol<7-Epi-> (4.84%), β-Bourbonene (4.69%), Caryophyllene oxide (4.32%) and Geijerene (4.08%), Caryophyllene (2.99%), Sabinene (2.6%), 1,8-Cineole (2.58%), δ-Amorphene (2.56%), δ-Cadinene (2.24%) and α-Pinene (2.07%) as listed in Table 1.

Table 1.The composition of the essential oil of *H. longiflorus*Benth.

No.	Essential oil compounds	RI*	Area%
1	α-Thujene	926	0.61
2	α-Pinene	933	**2.07**
3	Sabinene	961	**2.60**
4	Myrcene	994	0.17
5	α-Terpinene	1012	0.19
6	1,8-Cineole (Eucalyptol)	1027	**2.58**
7	γ-Terpinene	1055	0.35
8	Sabinene Hydrate	1065	0.21
9	α-Terpinolene	1082	0.11
10	Linalool	1088	0.94
11	Geijerene	1143	**4.08**
12	Terpinene-4-ol	1166	1.01
13	α-Terpineol	1175	**4.95**
14	Pulegone	1225	0.71
15	δ-Elemene	1389	0.20
16	β-Bourbonene	1395	**4.69**
17	Methyl Eugenol	1396	0.49
18	Caryophyllene	1430	**2.99**
19	Farensene	1436	1.68
20	Germacrene D	1488	**5.76**
21	Bicyclogermacrene	1492	0.90
22	δ-Amorphene	39.04	**2.56**
23	δ-Cadinene	1510	**2.24**
24	Hedycarvol	1549	**22.20**
25	Caryophylleneoxide	1580	**4.32**
26	Cubenol	1626	1.09
27	α-Cadinol	1637	**20.43**
28	Eudesmol<7-Epi->	1649	**4.84**
29	α-Bisabolene epoxide	1661	1.40
30	Phytol	1784	0.14
		Total identification	96.51

*RI, retention indices relative to C6–C24 n-alkanes on the DB-5 column

The gas chromatograms obtained from the aerial parts of plants are shown in Figure 1. Additionally, in order to confirm the results of this study the two mass spectrums of major components (Hedycaryol and α-Cadinol) are shown in Figures 2-3.

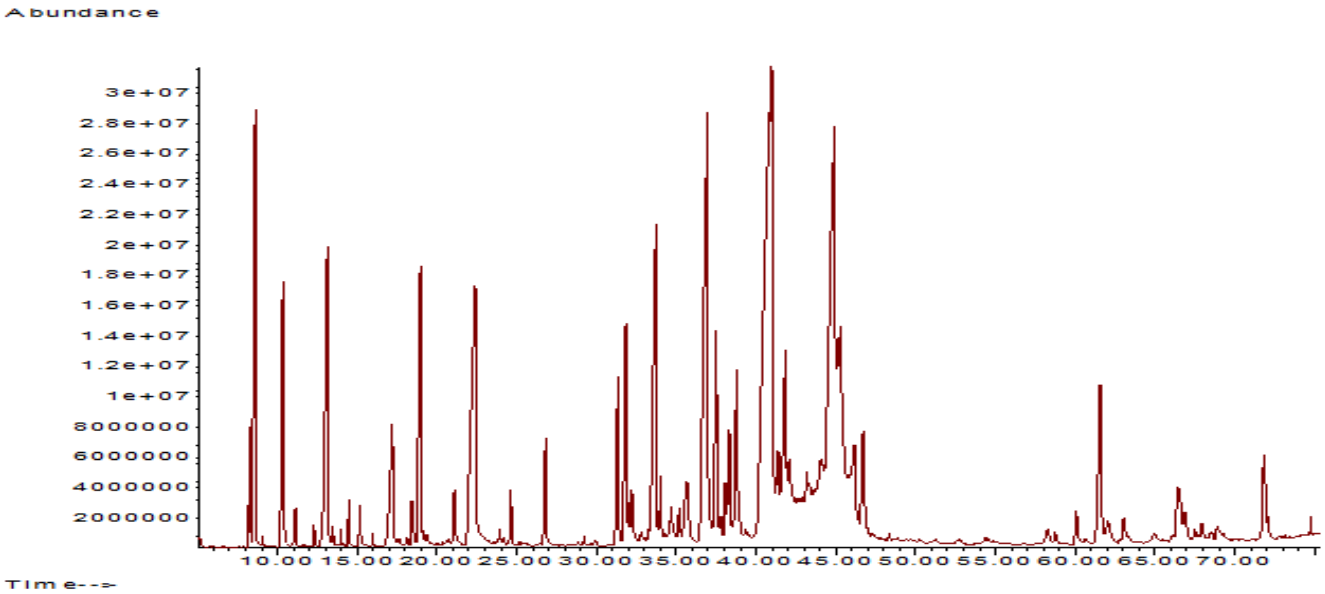

Fig. 1. The GC/MS chromatogram of aerial parts of *H. longi longiflorus* Benth.

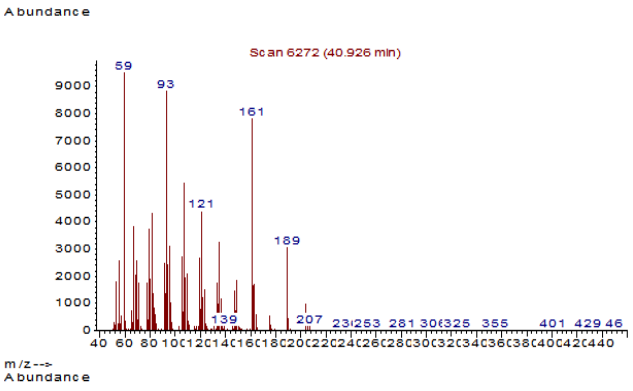

Fig. 2. The mass spectrum of Hedycaryol identified in GC chromatogram of *H. longiflorus* Benth.

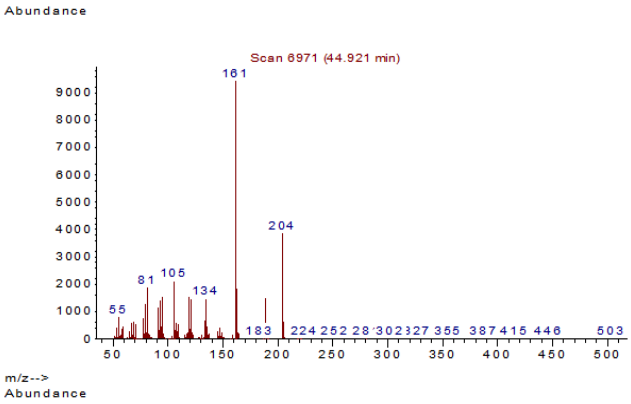

Fig. 3. The mass spectrum of α-Cadinol identified in GC chromatogram of *H. longiflorus* Benth.

The antimicrobial activity of Hymenocrater genus was recognized previously but recently, Ahmadi et al (2010) and Taherpour et al (2011), reported the antimicrobial activity of the extract of aerial parts of *H. longiflorus*[4, 5, 9, 10].

With respect to the knowledge on the essential oil of the studied Hymenocrater genus, the *H. calycinus* samples (A, B and C) were collected from different locations (Khorasan and Golestan) of Iran. The main constituents of essential oil of sample A were α-Pinene (10.5%) and Sabinene (10.5%) while Spathulenol (35.4%) and Abietatriene (13.4%) were the main compounds of sample B. In sample C, β-Caryophyllene (32.8%) and Caryophyllene oxide (16.1%) were the most abundant compounds [11]. These changes in the essential oil compositions might arise from several environmental (climatical, seasonal, geographical) and genetic differences[12].

Conclusion

Hymenocrater longiflorus Benth was collected from Paveh, Kermanshah province, Iran and is utilized as the medicinal herb in Kermanshah, Iran. The essential oil of *H. longiflorus*was chemically analyzed. 30 components were found in the essential oil of *H. longiflorus*. Regarding the chemical analysis, the major compounds identified were Hedycaryol (22.2%), α-Cadinol (20.43), Germacrene

D (5.76%), α-Terpineol (4.95%), Eudesmol<7-Epi-> (4.84%), β-Bourbonene (4.69%), Caryophyllene oxide (4.32%), Geijerene (4.08%), Caryophyllene (2.99%), Sabinene (2.6%), 1,8-Cineole (2.58%), δ-Amorphene (2.56%), δ-Cadinene (2.24%) and α-Pinene (2.07%).

Conflict of interest

Authors certify that no actual or potential conflict of interest in relation to this article exists.

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