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Chemical Composition and Antioxidant Activity of Essential Oil from Elsholtzia Bodinieriri Vaniot

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ABSTRACT

[Objective] To study the chemical constituents and antioxidant activity of essential oil from Elsholtzia Bodinieriri Vaniot. [Method] The oil from Elsholtzia Bodinieriri Vaniot was obtained by distillation and identified by gas chromatograph-mass spectrometer (GC-MS). Antioxidant activity of essential oil was testified through DPPH radical scavenging activity. [Results] The content of essential oil in Elsholtzia Bodinieriri Vaniot was 2.56‰. There were 16 components identified in the essential oil (accounted for 80.29% of all), and eucalyptus alcohol was the highest content component in essential oil (accounted for 43.57%). In the DPPH radical scavenging assay, the reaction time was 60min. In the range of 1.83-18.29μg/mL, the reducing power of essential oil was increased linearly along with its concentration. And its line fitting equation was y = 3.0058x +13.181 (R^2 = 0.9990), which IC_{50} value was 12.25μg/mL. [Conclusion] The essential oil from Elsholtzia Bodinieriri Vaniot has good antioxidant activity.

INTRODUCTION

Elsholtzia Bodinierir Vaniot, known as ‘Fengwei Tea’, is mainly distributed in Yunnan, Gansu in China. Elsholtzia Bodinierir Vaniot, a common folk Chinese

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herbal medicine for the treatment of fever, hepatitis and other diseases, has strongly intrigued us to investigate its potential as natural antioxidant [1]. The content of essential oil in Elsholtzia Bodinieriri Vaniot was 0.25-0.35%. Many studies showed the oil had good antimicrobial, insecticidal ability. Cancer and aging related to the imbalance of free radicals. Antioxidants play important roles in the inhibition of oxidative reactions in food, pharmaceutical and cosmetic products and the prevention of oxidative stress related diseases in the human body [2]. Many kinds of essential oils have been proved to be able to inhibit free radical reactions, retard oxidative rancidity of lipids, protect the human body from diseases, and preserve foods from spoiling. This research aims to analyze the complex chemical compositions of essential oil from Elsholtzia Bodinieriri Vanioti by GC-MS and evaluate its antioxidant ability.

Chemical Composition of The Essential Oil From Elsholtzia Bodinieriri Vaniot

Nowadays the investigation of biological activities of essential oils from various aromatic plants has been one of the attractive research areas. The essential oil has a great application prospect in the health food and drug industry [3]. By steam distillation, yellow transparent oil was collected. The density of essential oil is 0.9147g/mL. The content of essential oil in Elsholtzia Bodinieriri Vaniot was 2.56‰. The chemical composition of the essential oil was investigated by the Gas chromatography/mass spectrometry (GC/MS). According to the GC-MS analysis, 16 components were identified in the essential oil, accounted for 80.31% of the total oil (Table I). The major compounds in the essential oil were eucalyptus alcohol (43.57%), acetyl succinic acid(11. 27%), and vinyl pentene (4. 12%), etc.

TABLE *I.* CHEMICAL COMPOSITION OF THE ESSENTIAL OIL FROM ELSHOLTZIA BODINIERIR VANIOT.

No.	Compounds	Rt min	Mr	Composition(%)
1	Eucalyptus alcohol	13.178	154	43.57
2	Adipic ketone	26 . 416	136	11. 27
3	Vinyl pentene	19 . 745	94	4. 12
4	Camphor	18 . 253	102	3. 02
5	Bicyclic heptane	10 . 967	136	2. 20
6	Pinene	10 . 628	136	2. 03
7	Terpineol	20 . 559	154	1. 92
8	Linalool	18 . 047	136	1. 80
9	2,4-dimethyl styrene	16 . 060	132	1. 68
10	2,5-Heptyl diene	18 . 953	96	1. 59
11	Cycloheptadiene	20 . 847	94	1. 46
12	Terpineol	20 . 641	154	1. 20
13	Borneo camphor	15 . 391	170	1. 18
14	Triethanolamine	19 . 364	136	1.10
15	Acetyl succinic acid Vinyl	22 . 422	150	1.07
16	pentene	21 . 104	150	1. 00

Reaction Kinetics of DPPH System

In the test of DPPH radical scavenging activity, the response time was a key factor, and the time required to be determined in advance. Figure 1. shows the changing pattern of DPPH's radical scavenging rate with time in different extraction concentration. We drew a conclusion that the free radical scavenging reaction of essential oil from Elsholtzia Bodinierir Vaniot will be stable at 60 min. After mixing 0.2mmol/L DPPH ethanol solution with different concentrations of the essential oil from Elsholtzia Bodinierir Vaniot, the characteristic absorption peak has a significant decline at 518nm, showing the scavenging activity to DPPH radical.

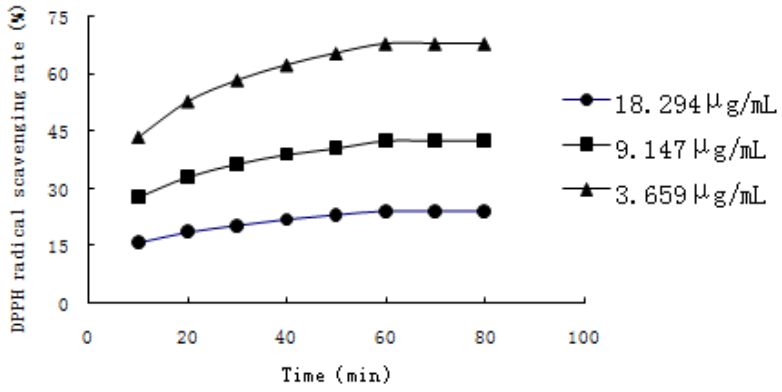


Figure 1. Changes in inhibition of DPPH after addition of essential oil from Elsholtzia Bodinier Vaniot.

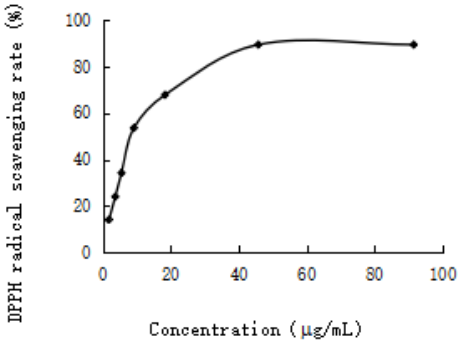
DPPH's Radical Scavenging Rate of Elsholtzia Bodinierir Volatile Oil

At equilibration, the DPPH radical scavenging rates were determined by a series of concentration of essential oil from Elsholtzia Bodinierir Vaniot. As indicated in Figure 2, the DPPH radical scavenging rate was markedly increased under the mass concentration of 20μg/mL. Therefore, we choose the concentration from 1.83 μg/mL to 18.29μg/mL of essential oil to determine the IC50 accurately. The standard curve was draw with the concentration (μg/mL) as the abscissa (X), absorption value (A) as the ordinate (Y). As indicated in Figure 3, The reducing power of essential oil was increased linearly along with its concentration. And its line fitting equation was Y = 3.0058X +13.181 (R2 = 0.9990), which IC50 value was 12.25μg/mL.

CONCLUSION

Nowadays the essential oil from Elsholtzia Bodinier Vaniot is used as tea, the application fields of health food and drug industry can be expanded undoubtedly if it shows antioxidant activity [4]. By steam distillation, yellow transparent oil was collected. We investigated the chemical composition of essential oil from Elsholtzia Bodinier Vaniot by GC-MS. In a dose-response experiment, IC50 is 12.25 μg/mL, suggesting it could have a strong inhibiting effect to DPPH radical. Thus, the essential oil is a good electronic supplier.

The content, the composition and the antioxidant activity of essential oil from Elsholtzia Bodinier Vaniot were evaluated. The results may provide the knowledge of the antioxidant potential of essential oil from Elsholtzia Bodinier Vaniot for use in the health food and drug industry [5].



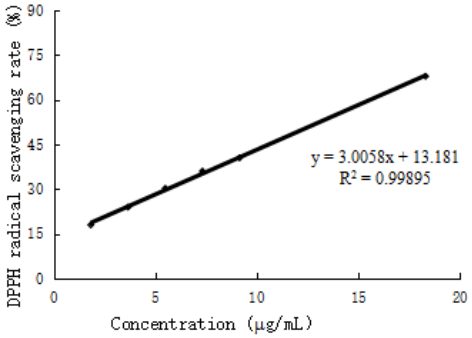


Figure 2. Relationship between DPPH radical scavenging rate and the concentration of essential oil from Elsholtzia Bodinierir Vaniot(60min).

Figure 3. Linearity correlation between DPPH scavenging rate and concentration of essential oil from Elsholtzia Bodinierir Vaniot.

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