Chemistry of Natural Compounds, Vol. 45, No. 4, 2009

CHEMICAL COMPOSITION AND HYPNOTIC ACTIVITIES OF THE ESSENTIAL OIL FROM ROOTS OF *Valeriana officinalis* VAR. *latifolia* IN CHINA

Baokang Huang,[1*] Luping Qin,[1] Yuming Liu,[2] Qiaoyan Zhang,[1] Khalid Rahman,[3] and Hanchen Zheng[1]

UDC 547.913

Insomnia is one of the most common complaints among adults. It is estimated that approximately 30 to 40% of adults in the world suffer from insomnia with difficulty in initiating or maintaining sleep, and about 3 to 10% of all people are chronic and frequent users of hypnotics [1]. However, it is well known that the most extensively used benzodiazepines show many unpleasant reactions, such as drug dependence, tolerance, rebound insomnia, and amnesia. Many people suffer from insomnia and look for natural ways to treat it. There are many herbs for insomnia that can help resolve many of the signs and symptoms of sleep disorders [2, 3].

There are about 31 species of Valerian genus in China [4]. *Valeriana officinalis* var. *latifolia* has a distribution nearly throughout Euroasia. It is the most commonly used herbal product to induce sleep and improve sleep quality in both the United States and Europe and without dependence potential or any appreciable side-effects [5]. It can also be used in the treatment of restlessness and cardiovascular disorders [6, 7].

The compounds of the essential oil from roots of *V. offiicinalis* var. *latifolia* in China was analyzed by GC-MS, and 46 components were identified from the essential oils. The major compounds are 4-methylene-1-methyl-2-(2-methyl-1-propen-1-yl)-1-vinylcycloheptane (36.8%), bornyl acetate (22.55%), borneol (4.9%), 3(10)-caren-4-ol, acetoacetic acid ester (3.4%), and longipinocarvone (3.4%) (Table 1).

The method of pentobarbital-induced sleeping in mice is a classic pharmacological experiment on screening of hypnotic drugs. The differential dose of pentobarbital can affect the experimental result significantly. We applied the suprahreshold dose of 50 mg/kg as the experimetal dose through our pre-experiment, and both the sleeping time and the coefficient of variation were considered.

Administration of EVOL (500 and 750 mg/kg, i.p.) showed significantly hypnotic effect in pentobarbital (50 mg/kg) – treated mice ($P<0.05$), and the dose-effect relationship was remarkable in sleeping time and sleep latency. The sleep latency of mice decreased significantly, and the sleeping time increased remarkably.

The composition of essential oils varied with different species or varieties. The present study showed that essential oil from the root of *V. officinalis* L. var. *latifolia* was different from that of *V. officinalis*. The pure fragrance compounds, including borneol and bornyl acetate, were reported to have sedative effects after inhalation in an animal experiment [8]. Our study confirmed that the essential oil significantly potentiated the hypnotic activity of pentobarbital in mice by both shortening the sleep latency and increasing the sleep time. Essential oils are the necessary active constituents of root of *V. officinalis* L. var. *latifolia.* The major component of the essential oil, 4-methylene-1-methyl-2-(2-methyl-1-propen-1-yl)-1-vinyl-cycloheptane, which differs from that of *V. officinalis*, needs further research to show its relation to the hypnotic activities.

V. officinalis L. var. *latifolia* grows widely nearly all over China. Because of its high yield and extensive medicinal usage, it is now cultivated in large scale in some provinces such as Hubei, and GuiZhou according to the GAP guideline. The essential oil from roots of *Valeriana officinalis* L. var. *latifolia* might be a natural potential source of hypnotic.

1) School of Pharmacy, Second Military Medical University, Shanghai 200433, Guohe Road 325 Shanghai, P. R. China, fax: 086 21 81871301, e-mail: hbkcn@163.com; 2) Research Center of New Drugs, Naval Medical Research Institute, Shanghai 200433, Xiangyin Road 880 Shanghai, 200433, P. R. China; 3) Faculty of Science, Liverpool John Moores University, Liverpool L3 3AF, UK. Published in Khimiya Prirodnykh Soedinenii, No. 4, pp. 474–475, July–August, 2009. Original article submitted November 29, 2007.

 0009-3130/09/4504-0560

TABLE 1. Essential Oil Composition from Roots of *Valeriana offiicinalis* var. *latifoia*

Compound	Rt, min	%	Compound	Rt, min	%
Isovaleric acid	4.867	0.1	Butanoic acid,2-methyl-,1,7,7-trimethylbicyclo-	14.944	0.8
α-Pinene	6.187	0.4	[2.2.1] hept-2-yl ester		
Camphene	6.454	2.4	Cadina-1(10), 4-diene	15.044	0.2
α-Pinene	6.941	0.3	Ledol	15.177	0.4
D-Limonene	7.808	<0.1	3(10)-Caren-4-ol acetoacetic acid ester	15.437	3.4
Borneol	10.095	4.9	Ledene oxide	15.857	1.1
p-Menth-1-en-8-ol	10.435	0.2	Bicyclo[3.1.1]hept-2-en-4-ol,	16.038	1.5
2-Pinen-10-ol	10.535	0.6	2,6,6-trimethylacetate		
2-Isopropyl-5-methylanisole	10.969	<0.1	8,9-Dehydrocycloisolongifolene	16.085	0.5
1-Methoxy-4-methyl-	11.042	<0.1	Spathulenol	16.345	2.9
2-(1-methylethyl) benzene			C-Eudesmol	16.518	0.4
Bornyl acetate	11.876	22.5	Eudesm-7(11)-en-4-ol	16.691	1.2
Myrtenyl acetate	12.389	0.3	Guaia-1(5),11-diene	17.285	0.6
p-Menth-1-en-8-ol acetate	12.710	0.7	4-Methylene-1-methyl-2-(2-methyl-	17.685	36.8
1,4-Dimethoxy-2-methyl-5-isopropylbenzene	13.650	0.3	1-propen-1-yl)-1-vinyl-cycloheptane		
1a,2,3,5,6,7,7a,7b-Octahydro-1,1,7,7a-	13.957	0.1	Longipinocarvone	17.865	3.4
tetramethyl-1H-cyclopropa[a]naphthalene			8-Cedren-13-ol	18.292	2.3
α-Caryophyllene	14.223	0.8	4-Camphenylbutan-2-one	18.819	0.4
7-Ethynyl-4a,5,6,7,8,8a-hexahydro-	14.284	1.3	Limonen-6-ol pivalate	19.040	0.5
1,4a-dimethyl-2(1H)-naphthalenone			Hexadecanoic acid	19.739	0.3
4-Methylene-2,8,8-trimethyl-2-vinyl-	14.397	0.3	Aromadendrene oxide-(2)	19.846	0.2
bicyclo[5.2.0]nonane			3-Hydroxy-pregn-5-en-20-one	19.959	1.2
3-(2,6,6-Trimethyl-1-cyclohexen-1-yl)-	14.477	0.2	Retinol acetate	20.266	0.2
2-propenal			Methyl eicosa-5,8,11,14,17-pentaenoate	20.639	1.8
trans-α-Lonone	14.550	0.1	2-Isopropyltricyclo[4.3.1.1(2,5)-	21.240	0.6
Isolongifolan-8-ol	14.677	0.3	undec-3-en-10-ol		
4-Isopropylidene-1-vinyl-o-menth-8-ene	14.757	0.4	1,5-Dimethyl-3-hydroxy-8-(1-methylene-	21.806	0.1
Dehydroaromadendrene	14.890	0.1	2-hydroxybicyclo[4.4.0]dec-5-ene		

Rt: retention time.

ACKNOWLEDGMENT

This research was funded by the National Natural Science Foundation of China (No. 30270152) and Shanghai-Unilever Research & Development Fund (No. 06SU07005). The authors are grateful to Hu Yaomin and Song Guoxin for the analysis of the essential oil by GC/MS.

REFERENCES

1. H. L. Freeman, *J. Drug. Dev. Clin. Pract.*, 7, 289 (1996).
2. H. Schiller, A. Forster, C. Vonhoff, M. Hegger, A. Biller, and H. Winterhoff, *Phytomedicine*, **13**, 535 (2006).
3. A. Capasso and L. Sorrentino, *Phytomedicine*, **12**, 39 (2005).
4. B. Huang, H. Zheng, L. Qin, Q. Zheng, and H. Xin, *J. Chin. Med. Mater.*, **9**, 632 (2004).
5. S. Bent, A. Padula, D. Moore, M. Patterson, and W. Mehling, *Am. J. Med.*, **119**, 1005 (2006).
6. S. F. Muller and S. Klement, *Phytomedicine*, **13**, 383 (2006).
7. C. Circosta, R. De Pasquale, S. Samperi, A. Pino, and F. Occhiuto, *J. Ethnopharmacol.*, **112**, 361 (2007).
8. G. Buchbauer, W. Jager, L. Jirovetz, F. Meyer, and H. Dietrich, *Pharmazie*, **47**, 620 (1992).