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COMPOSITION AND ANTIMICROBIAL ACTIVITY OF THE ESSENTIAL OIL OF *Mosla hangchowensis* ENDEMIC TO CHINA

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The genus *Mosla*, classified in the Lamiaceae family, comprises over 22 species and is distributed in India, Southeastern Asia, China, Korea, and Japan [1]. Some of the *Mosla* spp. have been applied in the treatment of heat stroke, miliaria, skin itch, impaludism, influenza, etc. [2].

M. hangchowensis Matsuda, endemic to China and resident in the coastland of Southeastern China, is an annual plant with a characteristic aromatic odor [1]. To our knowledge, no study on the use of *M. hangchowensis* in folk medicine has been cited in the literature. In the current project aimed at a phytochemical investigation and pharmacological screening of this plant, the essential oil of the aerial parts of *M. hangchowensis* was reported for the first time.

The essential oil was extracted from fresh aerial parts of *M. hangchowensis* as a pale yellow liquid in 0.45% yield. The GC-MS analysis of the essential oil resulted in the identification of 25 constituents, accounting for 93.60% of the oil. The compositions were listed in the order of their elution from the column (Table 1). As shown in Table 1, thymol (64.78%) and carvacryl acetate (14.19%) were the major compounds in the essential oil. The compositions could be classified into seven categories, namely oxygenated monoterpenes (79.87%), monoterpene hydrocarbons (4.43%), sesquiterpene hydrocarbons (3.53%), monocyclic hydrocarbons (2.08%), long-chain hydrocarbons (1.71%), diterpene hydrocarbons (1.47%), and oxygenated long-chain hydrocarbons (0.51%).

TABLE 1. Components of the Essential Oil from *M. hangchowensis*

Compound	RI	%	Compound	RI	%
cis-1,3-Dimethylcyclopentane	683	0.67	2-Ethyl-4,5-dimethylphenol	1312	0.16
trans-1,2-Dimethylcyclopentane	687	0.87	Carvacryl acetate	1392	14.19
Heptane	700	1.59	β-Caryophyllene	1422	2.87
Methylcyclohexane	719	0.24	2,6-Dimethyl-6-(4-methyl-3-pentenyl)-bicyclo[3.1.1]hept-2-ene	1439	0.30
2,4-Dimethylhexane	737	0.02			
2-Methylheptane	765	0.10	α-Caryophyllene	1454	0.23
1,3,5-Cycloheptatriene	788	0.17	(*S*)-6-Ethenyl-6-methyl-1-(1-methylethyl)-3-(1-methylethylidene)-cyclohexene	1493	0.13
cis-1,4-Dimethylcyclohexane	797	0.05			
(*E*)-2-Hexenal	862	0.10	Phytol	2110	1.47
(*Z*)-3-Hexen-1-ol	864	0.28	Oxygenated monoterpenes		79.87
Ethylbenzene	878	0.08	Monoterpene hydrocarbons		4.43
2-Methyl-5-(1-methylethyl)-bicyclo[3.1.0]hex-2-ene	929	0.03	Sesquiterpene hydrocarbons		3.53
1-Octen-3-ol	967	0.13	Monocyclic hydrocarbons		2.08
1-Methyl-4-(1-methylethylidene)-cyclohexene	1084	0.36	Long-chain hydrocarbons		1.71
1-Methyl-3-(1-methylethyl)-benzene	1009	2.07	Diterpene hydrocarbons		1.47
4-Methylene-1-(1-methylethyl)-cyclohexene	1040	1.97	Long-chain hydrocarbons		0.51
Terpinen-4-ol	1175	0.74	Total identified		93.60
Thymol	1296	64.78			

RI: linear retention index relative to *n*-alkanes on HP-5 column.

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TABLE 2. *In vitro* Antimicrobial Activity of Essential Oil from *M. hangchowensis*

Tested microorganisms	MIC, μL/mL	Tested microorganisms	MIC, μL/mL
Staphylococcus aureus	0.124	*Shigella dysenteriae*	0.500
Bacillus subtilis	0.500	*Candida albicans*	0.500
Escherichia coli	0.248	*Aspergillus niger*	1.000
Proteus vulgaris	0.500	*Microsporum canis*	1.500

The antimicrobial activity of the essential oil was estimated using a broth microdilution method to determine the minimum inhibitory concentration (MIC), as described by Barry [3]. The experimental results summarized in Table 2 revealed the remarkable inhibitory effect of the oil against all microorganisms investigated. The MIC values of the oil ranged from 0.124 μL/mL to 1.500 μL/mL, depending on the test microorganisms. The lowest MIC (0.124 μL/mL) was obtained against *Staphylococcus aureus*, while *Microsporum canis* was the most resistant one, presenting a MIC value of 1.5 μL/mL.

The present results suggest that the essential oil exerted potent antimicrobial activity and would be a potential source for alternative antiinfectious agents and food preservatives. Further investigation is needed to confirm the antimicrobial activity of minor components in the essential oil of *M. hangchowensis.*

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REFERENCES

1. C. Y. Wu and X. W. Li, *Flora Reipublicae Popularis Sinicae,* Vol. **66**, Science Press, Beijing, 1977, pp. 287–292.
2. Y. Y. Fang, *Flora of Zhejiang*, Vol. 5, Zhejiang Science and Technology Publishing House, Hangzhou, 1989, pp. 288–289.
3. L. Barry, *Methods for Testing Antimicrobial Combinations*. *The Antimicrobial* Susceptibility *Test: Principles and Practices*, Lea and Febiger, Philadelphia, 1976, p. 105.