SHORT COMMUNICATION

Chemical composition and biological activities of essential oil from *Filifolium sibiricum* (L.) Kitam

Shanshan Liang†, Qing Wei‡, Juan Xue, Yichun Sun, Zhili Chen, Haixue Kuang and Qiuhong Wang

Key Laboratory of Chinese Materia Medica (Ministry of Education), Heilongjiang University of Chinese Medicine, Harbin, China

**ABSTRACT**

The essential oil from *Filifolium sibiricum* (L.) Kitam were extracted using hydrodistillation and GC-MS was used to analyse the essential oil. The main components were espatulenol (8.55%), geranyl acetate (8.03%), carophyllene oxide (5.47%), calamenene (4.79%), geraniol (4.28%), calamenene (4.53%), geraniol (4.06%), cedrene epoxide (3.23%), myrtenol (3.18%), transgeranylgeranio (3.13%), etc. The essential oil showed intensive inhibitory effects against MCF-7 with IC₅₀ level of 0.78 mg/mL, HepG-2 with IC₅₀ level of 0.44 mg/mL, SKOV-3 with IC₅₀ level of 0.27 mg/mL, BGC-823 with IC₅₀ level of 0.34 mg/mL. In the antibacterial test, the essential oil showed the significant antibacterial activities. The MIC and MBC values were 5.20 and 5.20 mg/mL against *Staphylococcus aureus*.

1. Introduction

*Filifolium sibiricum* (L.) Kitam is a perennial herb, which widely distributed in Heilongjiang and Neimenggu Province of China. As a kind of Chinese traditional herbal medicine, *F. sibiricum* (L.) Kitam has been applied in treating infectious disease, fever, insomnia and...
neurasthenia in clinical (Wang 1979). Recent studies find that *F. sibiricum* (L.) Kitam have a good effect on antibacterial (Wang et al. 2011). A variety of compounds, such as alkaloids, flavonoids and coumarins, have been isolated from the plant (Wang 1984). The compounds from *F. sibiricum* (L.) Kitam had anti-inflammatory, antipyretic and analgesic effect.

To the best of our knowledge, studies on *F. sibiricum* (L.) Kitam essential oil are limited, and there are no published reports on the biological activities of *F. sibiricum* (L.) Kitam. In this study, we aimed to determine the chemical composition of *F. sibiricum* (L.) Kitam essential oil and evaluate its biological activities.

2. Results and discussion

The essential oil was analysed and the composition was showed in Table S1. Fifty-one constituents were found representing 87.59% of the oil.

2.1. Cytotoxicity activity

The essential oil was tested for cytotoxicity against four human cancer cell lines (MCF-7, HepG-2, SKOV-3 and BGC-823) using the MTT method as described in the literature (Xue et al. 2015). In MTT assay, four kinds of cell lines tested were susceptible to the essential oil with IC$_{50}$ from 0.27 to 0.78 mg/mL. The highest activity was observed against SKOV-3 cell lines with IC$_{50}$ 0.27 mg/mL and MCF-7 cell lines showed the weakest activity with IC$_{50}$ 0.78 mg/mL. While the IC$_{50}$ levels of HepG-2 and BGC-823 cell lines were 0.44 and 0.34 mg/mL. This is the first report on the cytotoxicity activity of essential oil from *F. sibiricum* (L.) Kitam.

2.2. Antibacterial activity

In the microwell dilution assay, the essential oil also presented antibacterial activities against all the bacterial strains tested with MIC values of 5.20 and 41.63 mg/mL. The negative control (2% DMSO) did not indicate activity for any of the microorganisms tested (Chen et al. 2015). The lowest MIC value was 5.20 mg/mL against *Staphylococcus aureus* and the essential oil showed weaker activity against *Staphylococcus albus* with 41.63 mg/mL. While the lowest MIC values of *Pseudomonas aeruginosa* and *Escherichia coli* were 10.41 and 10.41 mg/mL. The lowest MBC values against *S. aureus*, *S. albus*, *P. aeruginosa* and *E. coli* were 5.20, 83.25, 20.81 and 10.41 mg/mL, respectively.

It was reported that the essential oils had the antimicrobial activity (Vukovic et al. 2009; Hafez Ghoran et al. 2015; Kazemi & Rostami 2015). It may be the synergistic effect of the compounds from the essential oils.

3. Conclusion

The data presented earlier confirm the cytotoxicity activity of essential oil from *F. sibiricum* (L.) Kitam for the first time. The tested oil showed significantly cytotoxicity activity with the IC$_{50}$ values in the range of 0.27–0.78 mg/mL. In the antibacterial test, the essential oil showed the significant antibacterial activity. The MIC and MBC values were 5.20 and 5.20 mg/mL against *S. aureus*. The results of this analysis can provide some references and
basis for a better and more conducive to the full development and utilisation of *F. sibiricum* (L.) Kitam.

**Disclosure statement**

No potential conflict of interest was reported by the authors.

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