

Study of the qualitative composition of Schisandra chinensis leaves and hemlock spotted herb by HPLC in combination with mass spectrometry

E.H. Galiakhmetova, T.V. Bulgakov, S.R. Khasanova, N.V. Kudashkina (State Budgetary Educational Institution of Higher Professional Education Bashkir State Medical University, Ministry of Health of the Russian Federation, St. Ufa, Russia)

Study of the qualitative composition of leaves of Schisandra chinensis and grass of the hemlock of spotty by the HPLC method in combination with the mass spectrometry
EH Galiakhmetova, TV Bulgakov, SR Khasanova, NV Kudashkina
Bashkir state medical university (Ufa, Russia)

SUMMARY

The article deals with the study of the chemical composition of the leaves of Schisandra chinensis, introduced in the conditions of the Republic of Bashkortostan, and the grass hemlock spotted from the flora of the Republic of Bashkortostan. Methanol extracts were investigated using HPLC-MS. As a result of the studies carried out, 13 compounds were found in the leaves of Schisandra chinensis, of which 5 substances related to flavonoids and saponins were identified by the obtained mass spectra. In the grass of hemlock spotted, 17 compounds were found, of which 7 substances were identified based on the mass spectra of alkaloids and amino acids.

Key words: Schisandra chinensis leaves, hemlock grass, HPLC-MS, flavonoids, saponins, alkaloids, amino acids.

RESUME

The chemical composition of leaves of Schisandra chinensis introduced in Bashkortostan and grass of the Hemlock of spotty from the flora of Bashkortostan were examined. Methanol extractions were investigated by means of HPLC-MS. We found 13 compounds in leaves of Schisandra chinensis, 5 of them were identified as flavonoids and saponins. In grass of the Hemlock of spotty we found 17 compounds, 7 of them relate to alkaloids and amino acids.

Keywords: leaves of Schisandra chinensis, grass of the hemlock of spotty, HPLC-MS, flavonoids, saponin, alkaloids, amino acids.

Expanding the range of medicines based on the domestic plant raw material base is one of the urgent tasks of modern pharmacy. A possible solution to this problem is the introduction into practice of new types of medicinal plant raw materials of already studied plants. One of these plants are Schisandra chinensis and hemlock spotted, the raw materials of which are studied in depth at the Department of Pharmacognosy with a course of botany and phytotherapy at the State Budgetary Educational Institution of Higher Professional Education BSMU of the Ministry of Health of Russia [1-3].

Hemlock spotted was included in the first four editions of the Russian Pharmacopoeias, but was subsequently excluded from medical practice due to its high toxicity. However, the plant is official in a number of countries in Western Europe and South America. Nowadays, spotted hemlock is mainly used by homeopathic doctors as a classic homeopathic remedy in the form of a tincture and

the drug "Konium-plus" [4].

Currently, there is no normative documentation for the raw material of hemlock spotted in Russia, which limits its use (mainly in folk medicine and homeopathic practice).

Schisandra chinensis attracts the attention of many scientists. Numerous studies are underway to study the chemical composition of various organs of this plant. In literary sources, mainly foreign authors, much attention is paid to the search for new pharmacological effects associated with the use of various plant materials of *schisandra chinensis* (fruits, seeds, bark of stems and roots with rhizomes, leaves) in various dosage forms (oil extracts, infusions, tinctures), as well as individual biologically active compounds (schizandrin, γ -schizandrin, homizin A and others) isolated from this medicinal plant.

When studying promising raw materials, an integral part is the study of their chemical composition. At present, to identify biologically active substances in plant raw materials, their physical and chemical properties are used: melting point, UV, IR, NMR spectra, and the angle of specific rotation. However, these methods require the isolation of a sufficient amount of substances and their high degree of purification. One of the methods for identifying compounds at present is the method of high performance liquid chromatography (HPLC) in combination with mass spectrometry (MS), since it allows one to separate substances in a mixture and identify them by mass spectra without using standard samples, which are not always available. ...

The aim of the work was to study the chemical composition of lemongrass leaves Chinese, introduced in the conditions of the Republic of Bashkortostan and grass hemlock, growing in the flora of the Republic of Bashkortostan.

Materials and research methods

Leaves of *Schisandra chinensis* introduced in the Republic of Bashkortostan and hemlock grass harvested from wild plants in various regions of the Republic of Bashkortostan in 2010–2014 were used for the study. during the flowering period. The dried raw material was crushed to a particle size passing through a sieve with holes 1 mm in diameter. About 10 g (accurately weighed) of the crushed raw material was placed in a 250 ml flask, poured in 100 ml of methanol and extracted in a boiling water bath with a reflux condenser for 2 hours. The study of the obtained methanol extraction and identification of biologically active compounds were carried out by HPLC-MS using an Agilent 1200 liquid chromatograph with a 6330 ion trap tandem mass spectrometric detector. Chromatography conditions: column Zorbax C18, 5 μ m, 2.1 x 150 mm ... Detection was carried out at a wavelength of 275 nm. Elution was carried out in a gradient mode; a mixture of acetonitrile and water was used as a mobile phase in the ratio (2:98; 5:95, 3: 7, 4: 6, 6: 4, 7: 3, 95: 5, 98: 2, 2:98). The flow rate was 0.8 ml / min, the volume of the injected sample was 10 μ l, and the elution time was 5 minutes. Substances were identified by mass spectra.

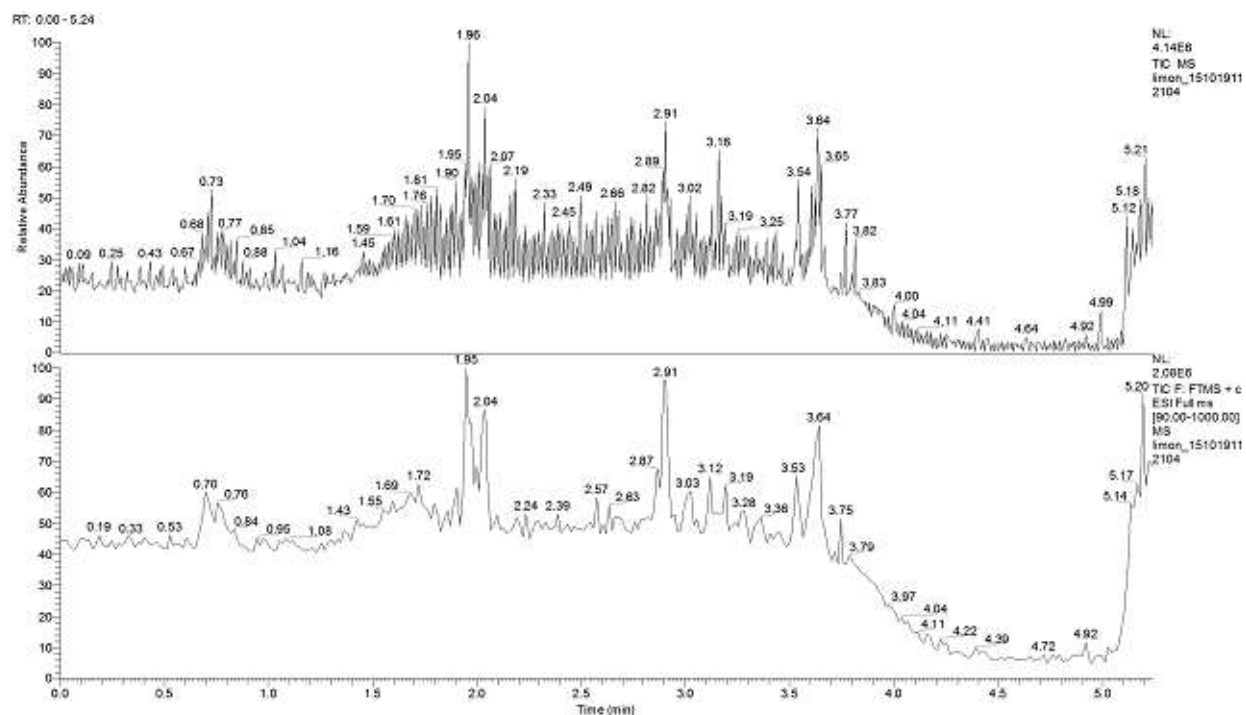
Research results and their discussion

During HPLC-MS, positive ions were registered in the mode

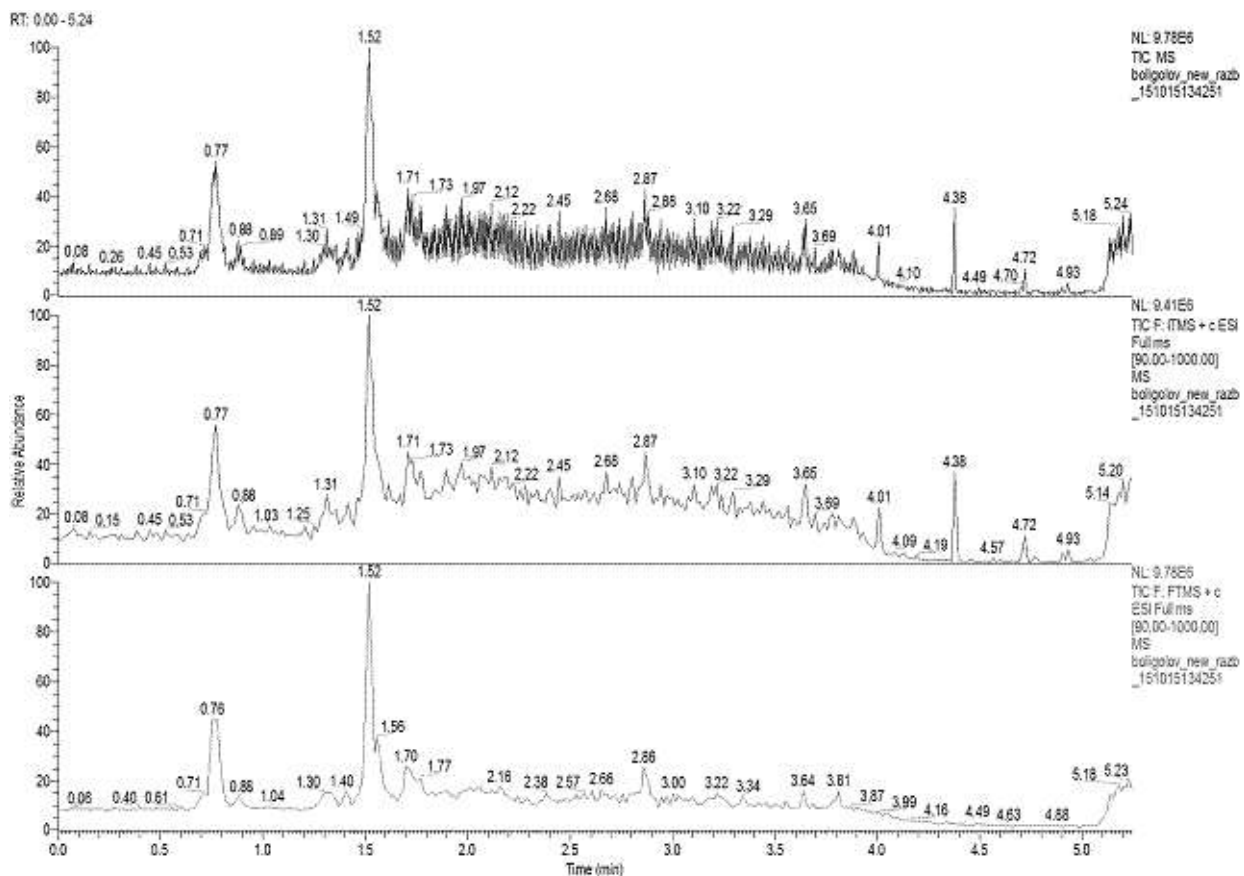
chemical ionization in the form of $[M + H]^+$ and $[M + Na]^+$. Therefore, to calculate the molecular weight, it was necessary to make a correction for "-1" in the case of $[M + H]^+$ and "- 23" in the case of $[M + Na]^+$ to the maximum values of m/z (from the intense peaks).

During the study, 13 compounds were found in the leaves of *Schisandra chinensis* (Fig. 1), of which 5 compounds were identified according to the obtained mass spectra of flavonoids (flavan-3-ol, rutin, astragalol, hyperoside) and triterpene saponin (lanostane) (Table 1).

In the study of the grass hemlock spotted, 17 compounds were found (Fig. 2), of which 7 compounds were identified based on the obtained mass spectra of alkaloids (coniine, methylconiine) and amino acids (proline, phenylalanine, isoleucine, tyrosine, and valine) (Table 2).



Rice. 1. Chromatogram of methanol extract of *Schisandra chinensis* leaves.



Rice. 2. Chromatogram of methanol extract of hemlock spotted herb.

Table 1

Results of identification of biologically active substances
lemongrass leaves by HPLC-MS

Retention time, min.	M / z value [M + H] ⁺	Substance
1.77	227.15	flavan-3-ol
1.89	611.1	routine
1.95	464.06	hyperoside
2.0	449.06	astragalinalin
2.89	415.17	lanostane

table 2

Results of identification of biologically active substances
Hemlock herb by HPLC-MS

Retention time, min.	M / z value [M + H] +	Substance
0,4	116.1	proline
0.52	118.07	valine
1.07	182.1	tyrosine
1.12	132.09	isoleucine
1.4	142.1	methylconiine
1.42	128.13	coniine
1.7	166.07	phenylalanine

Conclusion

Methanol extracts obtained from *Schisandra chinensis* leaves and hemlock herb were studied by HPLC-MS. The presence in them of various classes of compounds (flavonoids, saponins, alkaloids, amino acids) has been established, which contribute to the pharmacological properties of these plants. The data obtained expand the information on the chemical composition of these plant objects and can be used to develop standardization methods or taken into account in the development of a drug based on them.

Literature

1. Galiakhmetova E.Kh., Kudashkina N.V., Khasanova S.R. Chemical study Leaves of *Schizandra chinensis* *Schizandra chinensis* Baill., introduced in the Republic of Bashkortostan // Traditional Medicine. - 2010. - No. 3 (22). - pp. 112-114.

2. Khasanova S.R., Trofimova S.V., Kudashkina N.V. et al. Research component composition of essential oils of blood-red hawthorn leaves and hemlock grass from the flora of Bashkortostan // Bashkir Chemical Journal. - 2013. - T.20, No. 2. - P.103-105.

3. Khasanova S.R., Trofimova S.V., Faizullina R.R. et al. Research amino acid composition of some wild plants from the flora of the Republic of Bashkortostan // Bashkir Chemical Journal. - 2013. - T20, №1. - pp. 108–110.

4. State Register of Medicines [Electronic resource] - URL:
<http://grls.rosminzdrav.ru/grls.aspx>. - Title. from the screen.

Author's address

Khasanova S.R., Associate Professor of the Department of Pharmacognosy with a Course of Botany and Fundamentals of Phytotherapy, Bashkir State Medical University, Ministry of Health of Russia.

svet-khasanova@yandex.ru

The study of the qualitative composition of the leaves of *Schisandra chinensis* and grass Hemlock spotted by HPLC in combination with mass spectrometry / E.Kh. Galiakhmetova, T.V. Bulgakov, S.R. Khasanova, N.V. Kudashkina // Traditional medicine. - 2016. - No. 2 (45). - S.44-47.

[To favorites](#)