Phenolic compounds as a criterion for the authenticity and quality of a medicinal herbal raw materials and phytopreparations

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The phenolic compounds as the criteria of identity and quality of the herbal drugs and phytopharmaceuticals

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SUMMARY

New approaches to the standardization of medicinal plant materials containing phenolic compounds have been substantiated using standard samples of rosavin, syringin (eleutheroside B), gamma-schisandrin, rosmarinic acid, chicory acid, silybin, (phenylpropanoids), rutin, hyperoside, isosalipurposide, licurobine , cynaroside, tilianin, ginkgetin, 3,811-biaspigenin, nicotiflorin, narcissin, cyanidin-3-O-glucoside (flavonoids), frangulin A, sennoside B, 8-O-glucoside emodin, 1,7-dihydroxy3-carboxylic acid derivatives. Methods have been developed for the qualitative and quantitative analysis of the studied types of raw materials and phytopreparations using thin layer chromatography, high performance liquid chromatography, and spectrophotometry.

Key words: medicinal plants, medicinal plant raw materials, phytopreparations, phenolic compounds, phenylpropanoids, flavonoids, anthraglycosides, standardization, spectrophotometry.

RESUME

The new approaches to the chemical standardization of the herbal drugs and phytopharmaceuticals containing phenolic compounds, with use of standard samples of rosavin, syringin (eleutheroside B), triandrin, chicoric acid, rosemary acid, lavandoside, -shizandrin, silybin (phenylpropanoids) , rutin, hyperoside, cynarosidide, tilianin, licuraside, isosalipurposide, pinostrobin, hyperoside, ginkgetin, 3,811-bisapigenin, nicotiflorin, narcissin, cyanidin-3-O-glucoside (flavonoids), frangulin A, senn-glucosin 1,7-dihydroxy-3-carboxyanhraquinone (anthracenderivatives) were substantiated. The methodics of qualitative and quantitative analysis by means of TLC, HPLC, spectrophotometry was developed.

Keywords: medicinal plants, herbal materials, pharmaceuticals, phenolic compounds, phenylpropanoids, flavonoids, anthraglycosides, standardization, TLC, HPLC, spectrophotometry.

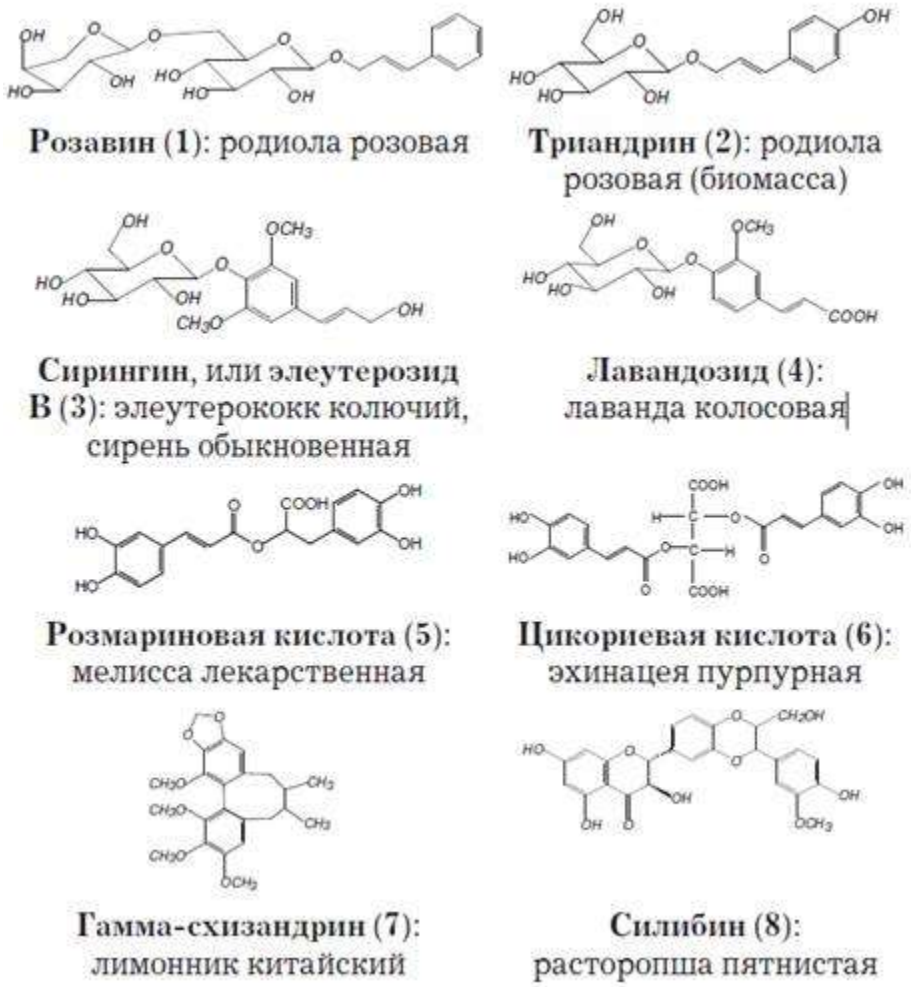
Introduction

Currently, one of the urgent tasks of pharmaceutical science is the creation and implementation of import-substituting medicines, including herbal medicines. In this regard, it is very important to take into account the rich experience of traditional medicine, and when studying and reviving patristic traditions, it is necessary to keep in mind their revival at a new scientific level. In particular, the development of modern drugs based on traditional formulations is possible only with the use of modern methods of standardizing these drugs.

The urgency of this problem is due to the fact that on the pharmaceutical market of the Russian Federation a significant proportion is occupied by foreign funds, and, as a rule, expensive. The creation and implementation of competitive import-substituting drugs, on the one hand, will contribute to the successful implementation of the Strategy for drug provision of the population of the Russian Federation for the period up to 2025, and on the other hand, will ensure the drug safety of the country. In this regard, medicinal plants containing phenolic compounds are of particular interest, which are a valuable source of adaptogenic, antidepressant, nootropic, anxiolytic, sedative, antiviral, antimicrobial, anti-inflammatory, hepatoprotective, choleretic, antioxidant and immunomodulatory herbal medicines [1-8].

In the group of phenolic substances, the most common are flavonoids, phenylpropanoids, and anthracene derivatives, which, due to their great structural diversity, have a wide spectrum of biological activity [1–8]. It should be noted that, based on the study of physicochemical, spectral and pharmacological properties, it was previously justified to introduce phenylpropanoids into pharmacognosy as an independent class of biologically active compounds (BAS), which was reflected in the textbook "Pharmacognosy" [3].

The aim of the study is to substantiate new approaches to the standardization of medicinal plant raw materials (MPR) and herbal preparations containing phenolic compounds.



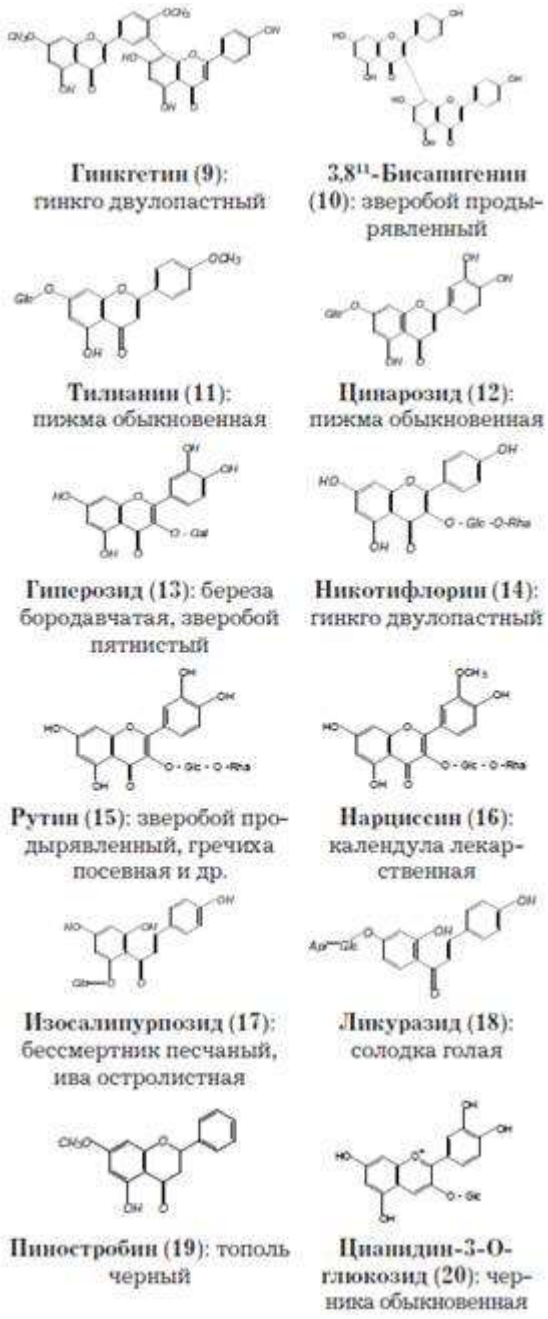
Rice. 1. Phenylpropanoids of medicinal plants

Material and methods

Rhizomes and biomass of Rhodiola rosea were used as objects. (Rhodiola rosea L.), common lilac bark (Syringa vulgaris L.), rhizomes and roots of Eleutherococcus spiny [Eleutherococcus senticosus (Rupr. et Maxim.) Maxim.], common lilac bark (Syringa vulgaris L.), seeds and fruits of schisandra chinensis (Schizandra chinensis Baill.), Lemon balm herb (Melissa officinalis L.), spike lavender flowers (Lavandula spica L.), leaves of ginkgo biloba (Ginkgo biloba L.), herb St. John's wort (Hypericum perforatum L.) and St. John's wort (Hypericum maculatum Grantz.), Echinacea purpurea herb [Echinacea purpurea (L.) Moench.], Fruits of milk thistle [Silybum marianum (L.) Gaertn.], Leaves of ginkgo biloba (Ginkgo biloba L.), flowers of common tansy (Tanacetum vulgare L.), sandy immortelle flowers [Helichrysum arenarium (L.) Moench.], Black poplar buds (Populus nigra L.), calendula flowers (Calendula officinalis L.), holly willow bark (Salix acutifolia Willd.), Warty birch leaves (Betula verrucosa Ehrh.), Licorice roots (Glycyrrhiza glabra L., buckwheat grass (Fagopyrum sagittatum Gilib.), Fruits of common blueberry (Vaccinium myrtillus L.), Joster fruits

laxative (Rhamnus cathartica L.), buckthorn bark brittle (Frangula alnus Mill.), Leaves of cassia holly (Cassia acutifolia Del.), Horse sorrel roots (Rumex confertus Willd.), As well as phenylpropanoids, flavonoids and anthracene derivatives isolated from the studied medicinal plant.

Used in the work thin layer chromatography (TLC), high performance liquid chromatography (HPLC), spectrophotometry, ^{1}H-NMR spectroscopy, mass spectrometry, various chemical transformations. ^{1}H-NMR spectra were obtained on a Bruker AM 300 (300 MHz) instrument, mass spectra were recorded on a Kratos MS-30 mass spectrometer, UV spectra were recorded using a Specord 40 spectrophotometer (Analytik Jena). The control over the separation of substances using column chromatography was carried out using TLC analysis on Sorbfil PTSKh-AF-A-UV plates in various solvent systems.



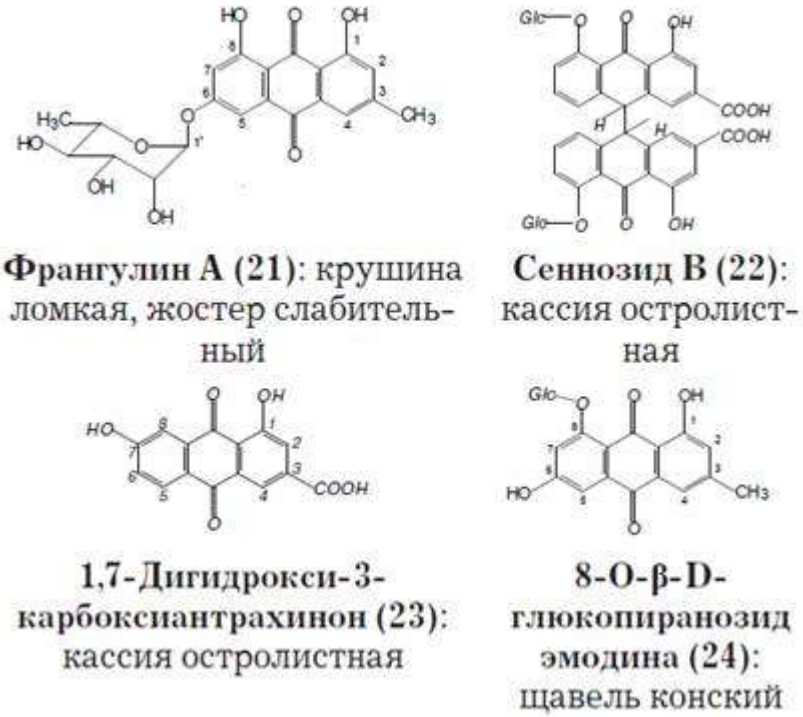
Rice. 2. Flavonoids of medicinal plants.

Results and discussion

As a result of studying the chemical composition of a number of medicinal plants, they isolated and characterized using UV-, NMR-spectroscopy, mass spectrometry, TLC and HPLC, various chemical transformations of phenylpropanoids (1-8), flavonoids (9-20) and anthracene derivatives (21- 24), which are of interest from the point of view of chemical standardization of raw materials and preparations of the corresponding medicinal plants (Fig. 1–3). Based on the study of the chemical composition of a number of medicinal plant species, approaches to the standardization of raw materials and phytopreparations have been formulated, which consist in using in

methods of analysis of standard samples rosavin (Rhodiola rosea), triandrin (biomass of Rhodiola rosea), syringin (eleutherococcus prickly, common lilac), silybin (milk thistle), lavender (lavender spicata), rosmarinic acid (lemon balm) (echipuric acid), gammashisandrin (schisandra chinensis), ginkgetina (ginkgo biloba), 3.8eleven- biaspigenin (St. John's wort), tilianina (common tansy), cynaroside (common tansy), hyperoside (warty birch, St. John's wort), nicotyflorin (ginkgo biloba), narcissin (calendula golosida), salipurite), pinostrobin (black poplar), cyanidin-3-O-glucoside (common blueberries), frangulin A (buckthorn brittle, laxative), sennoside B (cassia acutifolia), 1,7-dihydroxy-3-carboxyanthraquinone (cassia acutifolia) , 8-O --- D-glucopyranoside emodin (horse sorrel).

Thus, as a result of the studies carried out, new approaches to the standardization of medicinal plant materials and phytopreparations containing phenylpropanoids, flavonoids and anthracene derivatives have been substantiated using TLC, HPLC, spectrophotometry and the corresponding standard samples. Based on the study of the physicochemical, chemical, spectral and pharmacological properties of flavonoids, phenylpropanoids and anthracene derivatives, the expediency of creating a number of import-substituting drugs is substantiated, including taking into account the rich experience of traditional medicine, which successfully uses traditional formulations.



Rice. 3. Anthracene derivatives of medicinal plants.

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