Experimental study of the expectorant activity of infusion and water-soluble polysaccharides from the herb Ikotnik gray - Berteroa incana (L.) DC.

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The experimental study of expectorant activity of infusions and water-soluble polysaccharides from Berteroa incana (L.) DC. herb

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SUMMARY

The article presents the results of studying the expectorant activity of the infusion and water-soluble polysaccharides of the herb of the gray hiccup (Berteroa incana (L.) DC.) Of the Cabbage family (Brassicaceae).

It has been established that the infusion and water-soluble polysaccharides of the herb hiccups have expectorant activity, which gives rise to their further in-depth study as potential agents for the treatment of respiratory diseases. An experimental study of the expectorant activity of the infusion and water-soluble polysaccharides from the herb of gray hiccup was carried out for the first time.

Key words: gray hiccup, expectorant activity, Berteroa incana (L.) DC.

RESUME In this study, the investigation results of the expectorant activity of the infusion and water-soluble polysaccharides Berteroa incana (L.) DC. herbs family Brassicaceae are mentioned. It is found that the infusion and water-soluble polysaccharides of Berteroa incana have expectorant activity, what gives the basis for further profound study as potential agents for the treatment of respiratory diseases.

The experimental study of expectorant activity of infusion and water-soluble polysaccharides of Berteroa incana (L.) DC. has been realized for the first time.

Keywords: expectorant activity, Berteroa incana (L.) DC.

Introduction

The group of pathologies of the respiratory system, according to experts, remains the most common in comparison with other diseases [6]. One of the main groups used to treat diseases of the upper respiratory tract are expectorants, a significant part of them are of plant origin, the advantage of which is mild action, low toxicity and rare induction of allergic reactions, which is especially important in diseases requiring long-term treatment [eleven]. Of the entire species diversity of the domestic flora used historically in folk medicine, about

350 plants [9]. At the same time, only 15 types of medicinal plant materials are recommended as expectorants (marshmallow root, common anise fruit, wild rosemary shoots, oregano herb, ipecacuana root, mullein flowers, coltsfoot leaf, plantain flea seed and fresh grass, plantain large leaf, licorice root, pine buds, thermopsis lanceolate and alternate-flowered herb, violet herb, thyme herb), as well as 6 types of fees (breast collection No. 1, breast collection No. 2, breast collection No. 3, breast collection No. 4, Phytopectol No. 1 , Phytopectol No. 2) [2].

At the same time, the potential of the domestic flora is enormous. However, many plants are insufficiently studied chemically; there is no experimental substantiation of the effectiveness of their various pharmacological properties. One of the promising available domestic sources of expectorants can be the gray hiccup (Berteroa incana (L.) DC.) Of the Cabbage family (Brassicaceae), a biennial herb widespread in the flora of the regions of Central Russia [16]. This species is adapted to the temperate continental climate with cold winters and hot summers. In Russia, it grows in all regions of the European part, in the Caucasus, in Western and Eastern Siberia, as an invasive species in the Far East [5, 7, 16, 17]. On the territory of the Central Black Earth Region, according to N.S. Kamyshev, Gray hiccup is a common plant (occurrence rate 81–100%) [8]; in Kursk oblast, this species is widespread [14]. Ikotnik gray grows on dry calcareous and infertile soils. It occurs on rocky slopes, clearings, forest edges, clearings, meadows, fields, dry pastures, along roads, near dwellings, as a weed in crops [16, 17].

Ikotnik gray has long been used only in folk medicine. The first literary mentions of gray hiccups as a medicinal plant are found in the Botanical Dictionary by Andrei Meyer (1781), who pointed out that "... rubbed grass with honey drives away freckles and other spots on the body" [13]. Most often, the gray hiccup in the form of an infusion was used in folk medicine for convulsive contractions of the diaphragm - hiccups; it was used for diseases of the musculoskeletal system (arthritis), injuries, sprains, diseases of the digestive and nervous systems, for female diseases and bleeding after childbirth, some infectious and parasitic diseases, for malaise and fatigue for general strengthening of the body, as well as externally for washing wounds [5, 16]. Despite the widespread use of the plant for the treatment and prevention of various diseases, its chemical composition has practically not been studied. Our studies on the study of the chemical composition showed that the gray hiccup contains various groups of biologically active substances, including various groups of polysaccharides, phenolic compounds (flavonoids, phenolic acids, coumarins, tannins), organic and amino acids, triterpene saponins, carotenoids, macro- and microelements ... Given the significant raw material base, data on the chemical composition and use of the plant in folk medicine, we can talk about the prospects for a more in-depth chemical and pharmacological study of the gray hiccup, its further use in folk medicine, incl. and in Our studies on the study of the chemical composition showed that the gray hiccup contains various groups of biologically active substances, including various groups of polysaccharides, phenolic compounds (flavonoids, phenolic acids, coumarins, tannins), organic and amino acids, triterpene saponins, carotenoids, macro- and microelements ... Given the significant raw material base, data on the chemical composition and use of the plant in folk medicine, we can talk about the prospects for a more in-depth chemical and pharmacological study of the gray hiccup, its further use in folk medicine, incl. and in Our studies on the study of the chemical composition showed that the gray hiccup contains various groups of biologically active substances, including various groups of polysaccharides, phenolic compounds (flavonoids, phenolic acids, coumarins, tannins), organic and amino acids, triterpene saponins, carotenoids, macro- and microelements ... Given the significant raw material base, data on the chemical composition and use of the plant in folk medicine, we can talk about the prospects for a more in-depth chemical and pharmacological study of the gray hiccup, its further use in folk medicine, incl. and in organic and amino acids, triterpene saponins, carotenoids, macro- and microelements. Given the significant raw material base, data on the chemical composition and use of the plant in folk medicine, we can talk about the prospects for a more in-depth chemical and pharmacological study of the gray hiccup, its further use in folk medicine, incl. and in organic and amino acids, triterpene saponins, carotenoids, macro- and microelements. Given the significant raw material base, data on the chemical composition and use of the plant in folk medicine, we can talk about the prospects for a more in-depth chemical and pharmacological study of the gray hiccup, its further use in folk medicine, incl. and in

monastery practice, as well as the possibility of its implementation in official medicine.

In the literature there is information about the use of gray hiccups and for the treatment of diseases of the respiratory system [5, 16]. However, there are no experimental data on the study of expectorant activity in the literature data. Therefore, it was of interest to conduct an experimental study of its expectorant activity.

Objective: study of expectorant activity infusion and water-soluble polysaccharides (WSPC) herb of gray hiccup.

The object of the study was air-dry crushed grass. gray hiccups. Raw materials were procured in 2012–2013. in the Kursk region during the period of mass flowering of plants. For the research, we used an infusion of gray hiccup herb, as well as VSPs isolated from medicinal plant materials according to the method of N.K. Kochetkov [10].

Research methods

The expectorant effect was studied using a model for studying the motor function of the ciliated epithelium of the frog esophagus according to V.V. Gatsura [1].

Experiments were carried out on autumn frogs Rana Temporarea. The animals were kept in standard conditions at the vivarium of the Kursk State Medical University. The studies were carried out in accordance with the rules adopted by the European Convention for the Protection of Vertebrate Animals used for Experimental and Other Scientific Purposes (Strasbourg, 1986) and Order No. 708n of the Ministry of Health and Social Development of Russia "On Approval of Laboratory Practice Rules" [15]. The efficacy of the expectorant action was compared with the expectorant drug Mukaltin, obtained from the herb marshmallow and containing a mixture of polysaccharides from the herb marshmallow [12]. The infusion was prepared according to GF-XI [3]; 1% aqueous solutions were prepared from VRPS and Mukaltin. The expectorant effect was assessed according to the following test. The frog was fixed on the cortical plate with its belly up. The test solution was applied to the tip of the tongue in an amount of 0.1 ml. To register the movement of the cilia, a 15 mm silk thread was used, which was placed at the base of the tongue 30 seconds after application of the solution. The stopwatch was used to observe the time during which the thread was swallowed. The time taken to move the thread by 10 mm without the drug (control) and after applying the test drug was recorded [4]. Taking into account the significant scatter of the initial velocities of movement of the ciliated epithelium from one animal to another, we used the calculation of the acceleration coefficient (CA), as the ratio of the velocity obtained after application of the study drug to the initial one. A decrease in this coefficient indicates an increase in the motor activity of the ciliated epithelium. To register the movement of the cilia, a 15 mm silk thread was used, which was placed at the base of the tongue 30 seconds after application of the solution. The stopwatch was used to observe the time during which the thread was swallowed. The time taken to move the thread by 10 mm without the drug (control) and after applying the test drug was recorded [4]. Taking into account the significant scatter of the initial velocities of movement of the ciliated epithelium from one animal to another, we used the calculation of the acceleration coefficient (CA), as the ratio of the velocity obtained after application of the study drug to the initial one. A decrease in this coefficient indicates an increase in the motor activity of the ciliated epithelium. To register the movement of the cilia, a 15 mm silk thread was used, which was placed at the base of the tongue 30 seconds after application of the solution. The stopwatch was used to observe the time during which the thread was swallowed. The time taken to move the thread by 10 mm without the drug (control) and after applying the test drug was recorded [4]. Taking into account the significant scatter of the initial velocities of movement of the ciliated epithelium from one animal to another, we used the calculation of the acceleration coefficient (CA), as the ratio of the velocity obtained after application of the study drug to the initial one. A decrease in this coefficient indicates an increase in the motor activity of the ciliated epithelium. which, after 30 seconds after application of the solution, was placed at the base of the tongue. The stopwatch was used to observe the time during which the thread was swallowed. The time taken to move the thread by 10 mm without the drug (control) and after applying the test drug was recorded [4]. Taking into account the significant scatter of the initial velocities of movement of the ciliated epithelium from one animal to another, we used the calculation of the acceleration coefficient (CA), as the ratio of the velocity obtained after application of the study drug to the initial one. A decrease in this coefficient indicates an increase in the motor activity of the ciliated epithelium. which, after 30 seconds after application of the solution, was placed at the base of the tongue. The stopwatch was used to observe the time during which the thread was swallowed. The time taken to move the thread by 10 mm without the drug (control) and after applying the test drug was recorded [4]. Taking into account the significant scatter of the initial velocities of movement of the ciliated epithelium from one animal to another, we used the calculation of the acceleration coefficient (CA), as the ratio of the velocity obtained after application of the study drug to the initial one. A decrease in

Statistical processing of the experimental results was carried out according to the method of GF XI [3] using the Student's t-test. The results were considered statistically significant when the effect was observed in 95% of cases ($p < 0.05$).

results

The results of the study of the expectorant activity of the infusion and the WPCS of the herb of gray hiccup are presented in table. one.

It was found that the investigated infusion of gray hiccup herb significantly increases the motor activity of the cilia of the ciliated epithelium of the frog's esophagus by 17.18% (acceleration coefficient 0.83), WPC - by 29.65% (acceleration coefficient 0.71), respectively. However, the expectorant activity of the investigated infusion and VPCS of gray hiccup herb is expressed somewhat lower than that of the infusion of the herb marshmallow medicinal and the factory-made preparation Mukaltin (Table 1). The study of the expectorant activity of the infusion and the WPCS of the herb of gray hiccup was carried out for the first time.

Table 1

Influence of the infusion and CPVD from the herb of gray hiccup on the motor activity of the ciliated epithelium of the frog esophagus

Растение - настой, ВРПС	Коэф-фициент ускорения, M ± m	Увеличение двигательной активности, %, M ± m
Икотник серый (трава) – настой – ВРПС	 0,83 ± 0,01* 0,71 ± 0,01*	 17,18 ± 1,30* 29,65 ± 0,95*
Алтей лекарственный (трава) – настой	0,67 ± 0,01*	32,94 ± 0,97*
Мукалтин	0,61 ± 0,02*	38,91 ± 1,70*
Контроль (физ. раствор)	1,00	–

* – результаты статистически достоверны по сравнению с контролем (n = 6; P < 0,05).

Conclusions. Thus, the results of the experimental studies led to the following conclusions:

1. Infusion of the herb of hiccups gray significantly increases the motor the activity of the cilia of the ciliated epithelium of the frog's esophagus by 17.18% (acceleration coefficient 0.83), WPC - by 29.65% (acceleration coefficient 0.71), respectively.

2. The infusion and WPCS of the herb of hiccups have an effect on one of the mechanisms of expectorant action, which gives rise to their further in-depth study as potential agents for the treatment of respiratory diseases. The expectorant activity of the infusion and VPCS of the herb of gray hiccup has been studied for the first time.

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