

Study of the antimicrobial properties of pectin substances and herb infusion

Icotnik gray - *Berteroa incana* (L.) DC. I.L.

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The study of antimicrobial properties of pectin substances and infusion of *Berteroa incana* (L.) DC. herb

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SUMMARY

The article presents the results of a study of the antimicrobial activity of the infusion and pectin substances of the herb of the gray hiccup (*Berteroa incana* (L.) DC.) Of the Cabbage family (Brassicaceae). It has been established that the infusion and pectin substances of the herb of hiccups have a wide spectrum of antimicrobial activity, which gives rise to their further in-depth study as potential antimicrobial agents for the treatment of diseases of the skin and mucous membranes caused by pathogenic staphylococci, enterobacteria, bacilli, yeast-like fungi. The antimicrobial effect of the infusion and pectin substances from the herb of gray hiccup has been studied for the first time.

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

RESUME

In this study, the research results of the antimicrobial activity of the infusion and pectin substances *Berteroa incana* (L.) DC. herbs family Brassicaceae are presented. It is found that the infusion and pectin substances of *Berteroa incana* have a broad spectrum of antimicrobial activity, what gives the basis for further profound study as potential antimicrobial agents for the treatment of skin and mucous membranes diseases caused by pathogenic staphylococci, enterobacteria, bacilli, yeast-like fungi.

Antimicrobial effect of infusion and pectin substances of *Berteroa incana* (L.) DC. has been investigated for the first time.

Keywords: antimicrobial activity, *Berteroa incana* (L.) DC.

Introduction

Currently, about 20 thousand species of medicinal plants are used in the world, of which the largest number is used in Arab, Indian (including Ayurvedic), Chinese, Tibetan, Iranian folk and traditional medicine [1]. At the same time, in the modern therapy of various pathologies, a special role is played by the use of herbal preparations as antimicrobial agents. This is due to the fact that most infectious diseases (in particular, skin and mucous membranes) have a chronic, sluggish

character, which implies long-term use for the treatment of antimicrobial agents (usually synthetic drugs or antibiotics). With high efficiency of these agents, they cause a number of undesirable or side effects: resistance of pathogens, changes in the body's immunological reactivity, allergic reactions, toxicity, etc. [7, 11, 12]. When prescribing drugs with an antibacterial effect, one should take into account the high activity of the active substances and a wide range of their antimicrobial action, as well as the relative harmlessness to humans in concentrations sufficient to suppress the growth and reproduction of microorganisms. Such a complex antimicrobial effect is typical for plants [2].

However, of the entire species diversity of the domestic flora used historically in folk medicine (more than 10 thousand species), about 350 plants are included in the State Register of Medicines of Russia [5]. At the same time, the biodiversity of medicinal plants is far from being fully utilized, which is due to the lack of data on resources, lack of information on the chemical composition, and poor knowledge of the pharmacological properties [8]. In this regard, there is a need to expand the raw material base of medicinal plants through the introduction of new types of domestic flora into official medicine and their complex use. One of the promising sources of antimicrobial agents is the gray hiccups (*Berteroa incana* (L.) DC.) - a biennial herb of the Cabbage family (Brassicaceae),

Gray hiccups are currently used only in folk medicine as a sedative for nervous hiccups, for the treatment of arthritis, convulsions in children, asthenia, sprains, heart disease, hypoxia, bronchial asthma, cough, choking, headache, stomach diseases, female diseases, bleeding after childbirth. Outwardly, it is used for restorative baths, for washing wounds and ulcers [9]. However, there are no experimental data on the study of antimicrobial activity in the literature data. In this connection, it was of interest to study the antimicrobial activity of the herb, hiccups.

Purpose of the work: to study the antimicrobial activity of infusion and pectin substances of the herb of gray hiccups.

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 hiccups herb, as well as pectin substances isolated from medicinal plant materials according to the method of N.K. Kochetkov [6].

Research methods.

The antimicrobial activity of the infusion and pectin substances (PF) of the herb of gray hiccups was determined *in vitro* by the method of serial dilutions followed by sowing a standard set of indicator strains of test cultures of microorganisms on the surface of agar in comparison with the control [4, 10]. The infusion was prepared according to GF XI [3], PV was used in the form of a 1% aqueous solution on a sterile

purified water. Various dilutions of the infusion and PV solution were prepared in sterile, melted and cooled to 50 ° C nutrient agar. After mixing, the contents were poured into sterile Petri dishes and left at room temperature. After the agar solidified, the dishes were divided into sectors.

Each sector was inoculated with a streak method with a suspension of daily cultures containing 100 million microbial bodies in 1 ml, in the amount of one bacteriological loop. The control consisted of inoculations of the same bacteria on nutrient media that did not contain the tested preparations. The inoculations were incubated in a thermostat at +37 ° C. The experimental results were taken into account after 24 hours and 48 hours (for fungi of the genus *Candida*). At the same time, the intensity of growth of colonies of microorganisms (strong growth, weak growth) or its absence was recorded. As test cultures were used: *Candida albicans* (ATCC 1274), *Pseudomonas aeruginosa* (ATCC 1313), *Escherichia coli* (ATCC 25922), *Proteus vulgaris* (ATCC 6896), *Staphylococcus aureus* (ATCC 209), *Bacillus cereus* (ATCC 6633).

results

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

Table 1

Antimicrobial activity of the herb of gray hiccups

№ п/п	Тест-культуры	Настой			Пектиновые вещества		
		1:2	1:4	1:10	1:2	1:4	1:10
1	<i>Pseudomonas aeruginosa</i> (ATCC 1313)	±	+	+	±	±	±
2	<i>Escherichia coli</i> (ATCC 25922)	-	+	+	±	±	±
3	<i>Proteus vulgaris</i> (ATCC 6896)	±	±	±	±	±	±
4	<i>Staphylococcus aureus</i> (ATCC 209)	±	+	+	-	±	+
5	<i>Bacillus cereus</i> (ATCC 6633)	-	-	-	±	±	±
6	<i>Candida albicans</i> (ATCC 1274)	-	-	±	-	-	-
7	КОНТРОЛЬ	+	+	+	+	+	+

Примечание: «-» - отсутствие роста; «±» - слабый рост;
«+» - сильный рост.

From the data table. 1 it follows that the infusion of gray hiccup herb exhibits antimicrobial effect against the following microorganisms: gram-positive spore-forming bacillus - *Bacillus cereus* (in all investigated dilutions), yeast-like fungi - *Candida albicans* (in a ratio of 1: 2 and 1: 4) and gram-negative enterobacteria - *Escherobacteria coli* (in a 1: 2 ratio). The PV solution showed a high fungistatic activity against fungi of the genus *Candida* (growth was suppressed in all dilutions), as well as antimicrobial activity against gram-positive staphylococci - *Staphylococcus aureus* (in a ratio of 1: 2). Weak growth of colonies was observed on a nutrient medium with the addition of infusion in the following microorganisms: *Proteus vulgaris* (in all dilutions), *Pseudomonas aeruginosa* and *Staphylococcus aureus* (in

ratio 1: 2), fungi of the genus *Candida* (in a ratio of 1:10). When the PV solution was introduced into the nutrient medium, a weak growth of microorganisms was observed: *Pseudomonas aeruginosa* (in all dilutions), *Escherichia coli* (in all dilutions), *Proteus vulgaris* (in all dilutions), *Bacillus cereus* (in all dilutions), *Staphylococcus aureus* (in a ratio of 1 :4).

Strains of *Pseudomonas aeruginosa* (in a ratio of 1: 4, 1:10), *Escherichia coli* (in a ratio of 1: 4, 1:10), *Staphylococcus aureus* (in a ratio of 1: 4, 1:10) were not sensitive to the studied infusion; to the investigated PV - *Staphylococcus aureus* (in a ratio of 1:10) - in the indicated concentrations, the investigated drugs did not inhibit the growth of these microorganisms.

Conclusions:

1. Infusion of the herb hiccups gray exhibits antimicrobial effect in the ratio of gram-positive spore-forming bacillus - *Bacillus cereus* (in all investigated dilutions), yeast-like fungi - *Candida albicans* (in a ratio of 1: 2 and 1: 4) and gram-negative enterobacteria - *Escherichia coli* (in a ratio of 1: 2).

2. The solution of pectin substances showed high fungistatic activity against fungi of the genus *Candida* (growth was suppressed in all dilutions) and gram-positive staphylococci - *Staphylococcus aureus* (in a ratio of 1: 2).

3. The infusion and pectin substances of the herb of gray hiccups have a wide spectrum of antimicrobial activity, which gives grounds for their further in-depth study as potential antimicrobial agents for the treatment of diseases of the skin and mucous membranes.

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