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### **In vivo study of the bioavailability of the “Ulcerafit” antiulcer herbal tea**

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**Abstract:** The conducted studies have established that the administration of extract from the antiulcer herbal tea at a dose of 10 mg / kg provides antiulcer activity in a model of acute gastric ulcer in rats caused by the administration of acetylsalicylic acid at a dose of 150 mg / kg. The investigated drug had an equivalent reliable gastroprotective effect, which was not inferior to the action of the reference drugs.

It can be assumed that the antiulcer herbal tea "Ulcerafit", consisting of licorice roots, calendula flowers and flowers yarrow, can be used for the prevention and treatment of gastric and duodenal ulcer.

**Keywords:** *Antiulcer drugs, antiulcer herbal tea, medicinal herbal raw materials, antiulcer activity.*

**Purpose of the study.** In recent years, despite significant advances in the development of antiulcer drugs of synthetic origin, many of which are characterized by the presence of side effects and have contraindications for use, medicinal plants remain one of the promising sources of new highly effective and harmless drugs for the treatment of gastric ulcer and duodenum. and in the complex therapy of destructive lesions of the gastrointestinal tract [1-5].

**Materials and methods.** This work examines the study of the bioavailability of the antiulcer herbal tea "Ulcerafit" consisting of the roots of licorice (*Glycyrrhiza glabra* L.), flowers of calendula (*Calendula officinalis* L.), and lowers of yarrow meadowsweet (*Achillea filipendulina*) in experimental gastropathy induced by acetylsalicylic acid.

In the previous work [6], the optimal composition of the antiulcer herbal tea and the ratio of medicinal plants were determined by the method of pharmacological screening.

According to the requirements of the general article of SP X1 "Infusions and decoctions" [7], aqueous extracts of medicinal plant materials are prepared by the method of infusion in the form of infusions or decoctions. Taking into account that the composition of the medicinal herbal tea contains both the roots and rhizomes of licorice, and flowers of yarrow meadowsweet and calendula flowers, we studied the effect of the extraction method on the efficiency of extracting extractives from medicinal plant materials. For this, both infusions and decoctions were obtained from the studied herbal tea by the method described in SP X1.

The research results are presented in table 1.

Table 1.

#### **Results of the study of obtaining water extracts from antiulcer herbal tea**

№	Extraction method	Extractive substances, in%
Herbal tea crushed to a size of 1-2 mm		
1.	Infusion	14,28±0,63
2.	Decoction	15,14±0,71

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Herbal tea, crushed to a size of 3-5 mm		
1.	Infusion	12,34±0,58
2.	Decoction	13,28±0,64
Herbal tea crushed to a size of 5-7 mm		
1.	Infusion	12,31±0,53
2.	Decoction	13,24±0,61

As can be seen from the data in Table 1, when obtaining aqueous extracts in the form of decoctions, the content of extractives was higher than when obtaining extracts in the form of infusions. Grinding of medicinal plant materials influenced the release of extractives. Extractive substances were released from the herbal tea with grinding particles to 1-2 mm in larger quantities than from the herbal tea with grinding particles of 3-5 mm and 5-7 mm. The release of extractives from charges with a particle size of 3-5 mm and 5-7 mm was practically identical. The amount of extractives extracted from the antiulcer herbal tea ranged from  $12.31 \pm 0.58$  to  $14.28 \pm 0.63$  in infusions and from  $13.24 \pm 0.61$  to  $15.14 \pm 0.71$  in decoctions, respectively. Taking into account that the composition of the antiulcer herbal tea includes flowers of medicinal plants [8], we consider it expedient to use the herbal tea with grinding particles of 1-2 mm, and obtaining an extract from the antiulcer herbal tea by the method of instruction.

The bioavailability of the antiulcer herbal tea "Ulcerafit" when compared with the flowers of Yarrow meadowsweet and the flowers of Calendula was studied in an acute experiment on the model of "acetylsalicylic ulcer" [9].

The experiment was carried out on white rats, weighing 180-220 g, which were divided into 5 groups of 6 animals: group 1 - intact; Group 2 - control; 3rd, 4th and 5th groups - experienced.

To simulate ulcers, animals in the control and experimental groups (groups 2, 3, 4, and 5) were administered twice with a 1% aqueous solution of acetylsalicylic acid at a dose of 150 mg / kg, produced by JSC "Borisov Plant of Medical Preparations", Belarus.

On the second and third days, one hour after the administration of acetylsalicylic acid, the experimental groups of rats were injected per os once a day with the studied drugs as follows:

Group 1 - intact - purified water in an amount of 1 ml;

Group 2 - control - 1% aqueous solution of acetylsalicylic acid at a dose of 150 mg / kg + purified water in an amount of 1 ml;

Group 3 - experimental - 1% aqueous solution of acetylsalicylic acid at a dose of 150 mg / kg + 5% aqueous infusion of antiulcer herbal tea at a dose of 500 mg / kg;

Group 4 - experimental - 1% aqueous solution of acetylsalicylic acid at a dose of 150 mg / kg + 5% aqueous infusion of Yarrow herb at a dose of 500 mg / kg;

Group 5 - experimental - 1% aqueous solution of acetylsalicylic acid at a dose of 150 mg / kg + 5% aqueous infusion of Calendula herb at a dose of 500 mg / kg.

On the 4th day, the animals were euthanized under Nembutal anesthesia (1% aqueous solution of sodium ethaminal at a dose of 40 mg / kg), the abdominal cavity was opened, the stomachs were removed, they were opened along the lesser curvature, washed with cold 0.9% NaCl solution and macroscopically using magnifiers under bright illumination determined the number

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and area of destruction, which were differentiated into point (less than 1 mm<sup>2</sup>), large (more than 1 mm<sup>2</sup>) and strip-like. Determined the total area of the formed ulcers in mm<sup>2</sup>.

Statistical processing of the data obtained was carried out using the Student's t-test.

**Results and discussion:** During the experiment on the study of bioavailability, it was revealed that on the gastric mucosa of rats of the control group after intragastric administration of acetylsalicylic acid for 3 days, various types of ulcers were formed: punctate -  $17.5 \pm 5.4$  pcs, large -  $1.3 \pm 0.5$  pcs and striped ulcers -  $1.3 \pm 0.5$  pcs with a total area of  $19.6 \pm 4.7$  mm<sup>2</sup> ( $P < 0.05$ ), while in intact animals on the gastric mucosa ulcers was not observed (Table 2).

Table 2

**Results of a comparative study of the bioavailability of the antiulcer herbal tea "Ulcerafit",  
 Yarrow meadowsweet flowers and Calendula flowers**

The values	Weight, g	Number of ulcers, pcs			Ulcer size, mm <sup>2</sup>
		Point	Large	Striped	General area, mm <sup>2</sup>
<b>Intact group</b>					
<b>M ± m</b>	199,8 ± 12,01	-			-
<b>Control group</b>					
<b>M ± m</b> <b>P</b>	194,3 ± 9,3	17,5 ± 5,4 P<0,05	1,3 ± 0,5 P<0,05	1,3 ± 0,5 P<0,05	19,6 ± 4,7 P<0,05
<b>Infusion of antiulcer herbal tea "Ulcerafit"</b>					
<b>M ± m</b> <b>P</b>	198 ± 14,04	1,3 ± 1,2 P<0,05	0 P<0,05	0 P<0,05	1,1 ± 0,9 P<0,05
<b>Infusion of Yarrow meadowsweet flowers</b>					
<b>M ± m</b> <b>P</b>	203,3 ± 10,5	2,1 ± 0,7 P<0,05	1,0 ± 0 P<0,05	0 P<0,05	2,2 ± 0,5 P<0,05
<b>Infusion of Calendula officinalis flowers</b>					
<b>M ± m</b> <b>P</b>	202,5 ± 11,6	2,0 ± 0,5 P<0,05	1,0 ± 0 P<0,05	0 P<0,05	1,8 ± 0,7 P<0,05

In rats receiving the Ulcerafit antiulcer infusion, only point ulcers were observed, in the amount of  $1.3 \pm 1.2$  pcs, with a total area of  $1.1 \pm 0.9$  mm<sup>2</sup> ( $P < 0.05$ ).

Under similar conditions, the infusion of Yarrow meadowsweet flowers had a moderate antiulcer effect; on the mucous membrane of the stomachs of rats, point ulcers were found in the amount of  $2.1 \pm 0.7$  and large, in the amount of  $1.0 \pm 0$ , the total area of ulcers formed was  $2.2 \pm 0.5$  mm<sup>2</sup> ( $P < 0.05$ ).

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On the mucous membranes of the stomachs of rats treated with the infusion of Calendula flowers, point ulcers were observed in the amount of  $2.0 \pm 0.6$  pcs, with a total area of  $1.8 \pm 0.79$  mm<sup>2</sup>.



Stomach mucosa  
intact rats



The gastric mucosa of rats treated  
with acetylsalicylic acid

Figure: 1. State of the gastric mucosa of intact rats and rats treated with acetylsalicylic acid



Gastric mucosa of rats treated with Ulcerafit antiulcer herbal tea

Figure: 2. The state of the gastric mucosa of rats that received the antiulcer herbal tea "Ulcerafit"

Thus, the study of the bioavailability of the antiulcer herbal tea "Ulcerafit" on the model of "acetylsalicylic ulcer" showed that the antiulcer herbal tea "Ulcerafit" had a pronounced antiulcer effect, preventing the appearance of ulcers on the mucous membrane of rats under the influence of acetylsalicylic acid.

A less pronounced, but reliable antiulcer effect was exerted by infusions of Yarrow meadowsweet and Calendula flowers.

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### **2.3 Conclusion:**

The data obtained show that the grinding of medicinal plant materials affects the release of extractive substances. Extractive substances were released from the herbal tea with grinding particles to 1-2 mm in larger quantities than from the herbal tea with grinding particles of 3-5 mm and 5-7 mm. The release of extractives from charges with a particle size of 3-5 mm and 5-7 mm was practically identical.

Taking into account that the composition of the antiulcer herbal tea includes flowers of medicinal plants [8], we consider it expedient to use the herbal tea with grinding particles of 1-2 mm, and obtaining an extract from the antiulcer herbal tea by the method of instruction.

The study of the bioavailability of the antiulcer herbal tea shows that the antiulcer herbal tea "Ulcerafit" has a pronounced, reliable antiulcer effect and can be used for the prevention and treatment of gastric ulcer and duodenal ulcer.

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