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MICROBIOLOGICAL AND ANTIBACTERIAL CHARACTERISTICS OF UROSEPTIC COLLECTION FROM MEDICINAL PLANT

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ABSTRACT

The purpose of this work was to determine the anti-inflammatory and antibacterial activity of “phytourosept” in an experiment and to evaluate its pharmacotherapeutic effectiveness in the complex treatment of patients with acute pyelonephritis. **Material and methods:** A new herbal remedy in the form of a dry extract from the herb Polygonum aviculare L., shoots of Arctostaphylos uva ursi L., flowers of Calendula officinalis L., leaf of Urtica dioica L., leaf of Vaccinium vitis idaea L. has pronounced anti-inflammatory and antibacterial properties that determine its pharmacotherapeutic effectiveness in the complex treatment of patients with acute pyelonephritis. **Conclusion:** The data obtained on the pronounced antibacterial and anti-inflammatory activity of “phytourosept” argue for the feasibility of its use in clinical practice as an effective safe agent intended for the treatment and prevention of infectious diseases of the urinary tract.

Key words: herbal remedies, antibacterial and anti-inflammatory properties, treatment of pyelonephritis.

INTRODUCTION

In the general structure of nephrological pathology, the largest share is occupied by diseases of infectious etiology: pyelonephritis and cystitis [4, 8]. The incidence of cystitis is from 26 to 35 million cases annually [7]. A characteristic feature of infectious diseases of the urinary tract is a recurrent course - up to 50% of cases of relapse within a year [11]. The main method of treatment and prevention of relapses of cystitis and pyelonephritis is adequate antibacterial therapy, however, long-term use of antibiotics is often accompanied by the development of negative side effects: allergies, resistance of pathogenic microflora to antibacterial drugs, suppression of immune reactivity of the organism [9]. In this regard, the development of new effective uro sepsis drugs that do not have side effects remains an urgent problem. One of the rational approaches to solving this problem is the creation of new multicomponent pharmacological agents based on plants widely used in nephron urological practice and the improvement of their galenic forms by converting them into extraction preparations, which are a sum of biologically active substances in a concentrated form. We have developed a urosepsis agent, which is a dry extract from the following types of plant materials: Polygonum avicularia L. herb, Arctostaphylos uva ursin L. shoots, Calendula officinalis L. flowers, Urtica dioica L. leaves, Vaccinium Vitis idea L. leaves, conventionally called "photoresist". A patent has been received for the method of obtaining a dry extract [5]. The following were identified in the dry extract using paper chromatography, thin layer chromatography and HPLC: apigenin, luteolin, quercetin, rutin, hyperoxide, myricetin; phenolic acids: chlorogenic, gallic, phenol glycoside arbutin; free and bound amino acids, among which histidine, tyrosine and alanine prevail. The dry extract is standardized based on the sum of flavonoids and phenol glycosides calculated as rutin and arbutin [10].

The aim of this work was to determine the anti-inflammatory and antibacterial activity of "photoresist" in an experiment and to evaluate its pharmacotherapeutic efficacy in the complex treatment of patients with acute pyelonephritis.

Methodology the method of double serial dilutions was used to evaluate the antibacterial activity. Museum cultures of opportunistic bacteria were used as test objects: Staphylococcus aureus 209 P., Proteus vulgaris H50, Escherichia coli-450 Novgorod kaya, Streptococcus faecalis, Pseudomonas aeruginosa ATCC-10145, obtained from the L.A. Gaskin State Scientific Research Institute of Culture. Tarasevich. The microbial load was 250 thousand cells per 1 ml. In k Escherichia coli 408 and Staphylococcus aureus 209P. The anti-inflammatory activity of photoresist was studied on Wistar rats of both sexes weighing 160-

180 g obtained from the Solobay nursery. The experiments were carried out in accordance with the Rules for Conducting Work Using Experimental Animals (Appendix to the Order of the USSR Ministry of Health No. 755 dated 12.08.77) and the Rules of the European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes. Euthanasia was performed under light ether anesthesia. The effect of photoresist on the processes of exudation, alteration and proliferation was determined in accordance with the guidelines set out in the Guide to the Experimental Study of New Pharmacological Substances [6]. Acute peritonitis was induced by intraperitoneal administration of 1 ml of 0.2% silver nitrate solution to white rats [2]. Animals of the experimental groups were administered "photoresist" intragastric ally at doses of 20.0; 40.0 and 80.0 mg/kg. Caleflon at a dose of 100 mg/kg was used as a comparison drug. In a series of preliminary experiments, the acute toxicity of "photoresist" was determined using the generally accepted Kerber method. The clinical study included 92 patients: women (31 ± 2.6 years) with clinical presentation of moderate acute pyelonephritis. All patients were hospitalized. The disease history ranged from several hours to 3-4 days. All patients sought medical care for this disease for the first time in their lives. The patients were randomly divided into 3 groups. The first group (main) - 30 patients, took a course of traditional treatment: antibacterial (cephalosporins, fluoroquinolones), anti-inflammatory therapy for 14-16 days, in addition to the main course of treatment - "anteroseptal", for 28 days. The second group (comparison) - 28 patients, took a course of traditional treatment: 14-16 days, in addition to the main course of treatment – canephor N in the form of drops – 50 drops 3 times a day or 2 tablets 3 times a day, for 28 days. The third group (control) – 34 patients, took only the traditional course of treatment for 14-16 days. The criteria for assessing the clinical efficacy were recovery, improvement or inefficiency of therapy. Statistical processing of the obtained data was performed using the Student's t-test and the Mann-Whitney test. Results Determination of the acute toxicity of "phytourosept" showed that its DL50 when administered intraperitoneally to white rats is 550 mg / kg (485.2-614.8); with intragastric administration, no death of animals was observed, the maximum amount of the drug that can be dissolved in the specified volume of water was 8000 mg / kg. The obtained data allow us to classify "phytourosept" as a group of practically non-toxic substances according to the current toxicity classification [6]. As follows from the data presented in Table 1, "phytourosept" has an antibacterial effect on all the studied opportunistic microorganisms. At the same time, the most pronounced effect was found in relation to the strains of

Staphylococcus aureus, Escherichia coli and Streptococcus faecalis, which are the agents that most often infect the urinary tract organs [6]. This is evidenced by the total inhibition of the growth of these strains when using "photoresist" at a concentration of 1.25 mg / ml, in lower concentrations the agent exhibits a bacteriostatic effect. Fitourosept has a slightly less pronounced antibacterial effect on Pseudomonas aeruginosa and Proteus vulgaris: bactericidal effect on the indicated strains is manifested at concentrations of 2.5 and 5.0 mg/ml, respectively. It was found that Fitourosept has a pronounced anti-inflammatory effect (Tables 2, 3). As follows from the data given in Table 2, the test agent in the indicated doses reduces the severity of tissue alteration in animals with acute aseptic inflammation induced by subcutaneous administration of acetic acid, and also stimulates the processes of regeneration of the skin-muscle defect. On the 2nd day of the study, the most significant ant alterative effect was found in rats receiving the phytoextract at doses of 40 and 80 mg/kg: the area of destruction in them was almost two times smaller than in animals of the control group. On the 7th and 25th days of the experiment, the area of the skin-muscle defect in the animals that received the phytoextract in the same doses was 30 and 50% smaller, respectively, than in the control. The anti-inflammatory effect of "photoresist" in the indicated doses exceeded that of the comparison drug Califon. The data presented in Table 3 indicate that "phytotron" at a dose of 40 mg / kg has an antioxidative effect, as indicated by a decrease in the severity of limb edema in animals with inflammation, as well as a decrease in the volume of intraperitoneal exudate in acute peritonitis by 18 and 30%, respectively, compared to similar data for animals in the control group. In addition, the development of acute peritonitis in animals of the control group was accompanied by the appearance of reddish-brown fluid in the abdominal cavity, as well as total degranulation of mast cells. Against the background of preliminary introduction of the test phytoextract, the intraperitoneal fluid in rats of experimental group 1 was transparent and had a yellowish opalescent tint, which indicates the absence of erythrocytes in it. In addition, in the mesentery of rats of this group, the number of degranulated tissue basophils decreased almost twofold. It was also established that the test agent does not have a significant effect on the formation of fibrous-granulation tissue in the inflammation focus. The anti-inflammatory activity of "phytourosept" in formalin edema and acute peritonitis was similar to that of the comparison drug caleflon. The results of the study of the pharmacotherapeutic efficacy of "phytourosept" in the treatment of patients with acute pyelonephritis are presented in Tables 4-7. As follows from the data presented in Table 4, the

clinical symptoms of the disease ceased significantly earlier in the groups of patients who received herbal preparations in addition to the basic therapy. Reliable differences in the reduction of the time of relief of clinical symptoms of the disease were recorded between the group of patients: receiving additionally phytourosept and receiving only basic treatment ($p < 0.05$). The dynamics of leukocyturia, reflected in Table 5, indicate that by the 14th day of treatment, normalization of urine test parameters was observed in almost all groups of patients. Leukocyturia persisted in three patients of Group III at the end of the treatment period (after 14 days), in two of them leukocyturia persisted on the 28th day of observation. In the groups of patients taking herbal preparations, by the 14th-16th day, blood and urine tests were normalized in all patients. As follows from the data presented in Table 6, the complex treatment with the use of "phytourosept" reliably increased the functional activity of the kidneys, as indicated by the increase in diuresis by the end of treatment, in contrast to the data of the control group of patients, as well as in patients taking Ca nephron. Of note is the tendency to decrease urine pH in patients taking "phytourosept", which is an important factor in preventing recurrent urinary infection, since the most favorable conditions for the development of urn pathogenic microbes are created with an alkaline urine reaction. Evaluation of the clinical effectiveness of the therapy showed that in all groups of patients who additionally took herbal preparations, there was recovery (Table 7). In the group of patients taking only basic therapy, recovery was achieved in 93% of cases, in 7% - improvement. Complete disappearance of pathogens was detected in all groups of patients. Conclusion Taking into account the obtained experimental and clinical data, it can be assumed that the mechanism of its anti-inflammatory action is non-specific and is due to the complex effect of the complex of biologically active substances included in its composition. In particular, data on the reduction in the severity of exudation and degranulation of tissue basophils indicate that one of the mechanisms of its anti-inflammatory action is associated with the presence of non-specific membrane-stabilizing activity, providing stabilization of the capillary endothelium, as well as the cell membrane of tissue basophils. The latter is accompanied by a blockade of the release of proinflammatory agents and a limitation of the inflammatory reaction. It can be assumed that the membrane-stabilizing activity of "photoresist" is due to the phenolic substances included in its composition (flavonoids, phenolic carboxylic acids, tannins, etc.), for which this type of activity is characteristic [1].

Table 1

The effect of "fiturosept" on the growth of bacterial cultures in a liquid nutrient medium

Concentration Phytouroseptic Mg/ml	Staphylococcus aureus	Proteus vulgaris	Escherichia coli	Pseudomonas aeruginosa	Streptococcus faecalis
Контроль	++++	++++	++++	++++	++++
20,0	-	-	-	-	-
10,0	-	-	-	-	-
5,0	-	-	-	-	-
2,5	-	++	-	-	-
1,25		+++	-	+	-
0,625	++-	+++	+	++	-
0,312	+++	+++	++	+++	+
0.156	+++	++++	++	+++	+++

Note: (-) no bacterial growth, (+) pronounced bacteriostatic effect, (++) bacteriostatic effect. (+++) weak bacteriostatic effect, (++++) no antibacterial effect.

Conclusion: The obtained data on the pronounced antibacterial and anti-inflammatory activity of "photoresist" argue for the advisability of its use in clinical practice as an effective safe agent intended for the treatment and prevention of infectious diseases of the urinary tract.

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