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The Determination of Antimicrobial Activity of Anti–Inflammatory Herbal Collection

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ABSTRACT: This article discusses the determination of antimicrobial activity of anti–inflammatory herbal collection. At present in connection with a considerable growth of cold and inflammatory diseases creation of biologically effective preparations is one of the most actual problems. With this in mind, we determined the antimicrobial activity of the composition of anti–inflammatory herbal collection.

KEYWORDS: antimicrobial action, Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, Candida albicans, Basillus subtilis.

INTRODUCTION

Anti–inflammatory drugs (PS)–a group of drugs that can relieve symptoms of inflammation, pain or reduce their manifestations. According to the mechanism of action PS are divided into drugs etiotropic and pathogenetic effects. Etiotropic therapy (Greek αἰτία – cause and τρόπος – direction) is the ideal type of pharmacotherapy. This type of pharmacotherapy (PT) is aimed at eliminating the cause of the disease. Examples of etiotropic pharmacotherapy (PT) can be treatment with antimicrobials in infectious patients (benzylpenicillin in streptococcal pneumonia), the use of antidotes in the treatment of patients with poisoning by toxic substances. Generally speaking, etiotropic agents include antimicrobials–antibiotics, sulfonamides–used mainly in infectious processes [1, 2].

Pathogenetic therapy is aimed at the development of the disease and the loss of disease. Most of the currently used drugs belong exactly to the group of drugs of pathogenetic Pharmacotherapy (PhT). Antihypertensives, cardiac glycosides, antiarrhythmic, anti–inflammatory, psychotropic and many other drugs have a therapeutic effect by inhibiting the corresponding mechanisms of disease development [2, 3].

At the Department of Pharmacognosy developed the composition of herbal anti–inflammatory collection, which includes (black currant leaf, common raspberry leaf, dog rose hips and licorice roots) for the treatment of inflammatory diseases of the upper respiratory tract. Medicinal plant material was harvested in Tashkent region in different phases of vegetation: Black currant leaves during flowering, common raspberry leaves after harvesting fruits, dog rose hips during fruiting, licorice roots in late fall.

There were prepared phytocompositions “Anti–inflammatory collection” according to the requirements of article “Collections” of SPh XI Uz. For this plant raw materials were ground individually to particle size, passing through a sieve with a hole diameter of 7 mm, then the dust was sifted through a sieve with a hole size 0.18 mm. Then the above components were weighed and stirred until a uniform mixture was obtained.

“Anti–inflammatory collection” is a mixture of whole leaves of black currant, common raspberry leaf, rose hips and pieces of roots and underground shoots of licorice. Leaves of common raspberry leaves are oval, lobed, petiolate, dark green above, whitish below, downy with fine hairs. Black currant leaves are alternate, petiolate, serrated or dentate at the edge; the leaves are dark green on the upper side, lighter on the lower side, pubescent along the veins. Rosehip powder is reddish, fine, with a characteristic odor. Pieces of licorice root cylindrical shape from light yellow to brownish–yellow outside with little traces of cork, the breakage is light yellow, fibrous. Fragrant specific odor tastes spicy–sweet, slightly irritating.

OBJECTIVE

Screening study of antimicrobial activity of extracts of anti–inflammatory herbal collection [4, 5].

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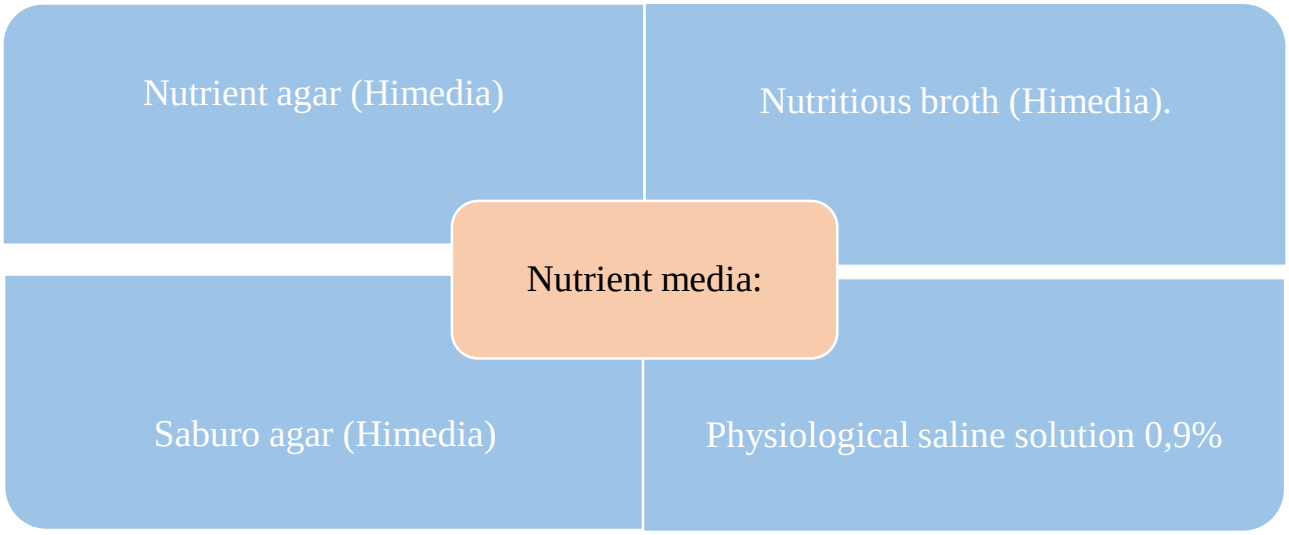
MATERIALS AND METHODS

The collection was prepared according to GF XI, GF Uzbekistan [3]. The following nutrient media were used in the work [Figure 1]:

Figure 1



The determination of the antimicrobial action of the test is sample. Determination of the antimicrobial action of the sample, an anti–inflammatory herbal collection, was carried out by diffusion in agar against some species of opportunistic bacteria: Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, Basillus subtilis and the yeast fungus Candida albicans (SPh XI, part 1, – p. 194). All cultures of microorganisms were obtained from the collection of the Institute of Microbiology of the Academy of Sciences of the Republic of Uzbekistan. Determination was carried out by the method of diffusion in agar on a dense nutrient medium [6].

Table 1. Conditions for cultivation of test microorganisms for the preparation of the inoculum

Microorganisms	Nutrient medium	Incubation temperature	Incubation time
Escherichia coli Pseudomonas aeruginosa Staphylococcus aureus Basillus subtilis	Nutrient Agar (Himedia)	34,5± 2,5^{0}C	From 18 to 24h
Candida albicans	Nutrient Agar (Himedia), Saburo Agar (Himedia)	30,5±2,5^{0}C	From 24 to 36 h

Preparation of the Inoculum. Grown cultures of test bacterial strains were washed off the surface of a slanted agar with sterile 0.9 % isotonic sodium chloride solution, a suspension was prepared with a cell count of 107 CFU/ml, McFarland turbidity standards are designed to determine the turbidity of bacterial suspensions in water, solutions or in liquid nutrient media by visual comparison [7].

Preparation of a sample of anti–inflammatory herbal collection 10 g of the collection was placed in a glass jar, poured 100 ml of boiling water and heated in a water bath for 15 minutes with frequent stirring, cooled for 45 minutes at room temperature, filtered through gauze, the remaining raw squeeze. The volume of the resulting infusion was brought to 100 ml of boiled and cooled water.

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Carrying out the experiments. Molten nutrient medium in the volume of 25 ml for bacteria–Nutrient Agar (Himedia), for yeast–Saburo Agar (Himedia) was poured into Petri dishes set on tables with strictly horizontal surface. The plates were dried in a laminar flow box. Bacterial suspension was inoculated onto the agar by dipping a sterile cotton swab into the suspension of the test microorganism, removing the excess of the suspension by squeezing the swab against the walls of the test tube. To obtain a uniform lawn, we applied the inoculum evenly in stroking motions over the entire surface of the agar. Wells were punched into the agar with a sterile steel cylinder 0.8 cm in diameter. 100 µl of test specimen was added to each well.

After addition of test samples, the plates were kept in the refrigerator for 3–4 h. The plates were then incubated in an incubator at 370 C for 20–24h for bacteria and at 300C for 24–36h for fungi. The experiment was performed twice.

Diagram 1. Antimicrobial activity of anti–inflammatory herbal collection

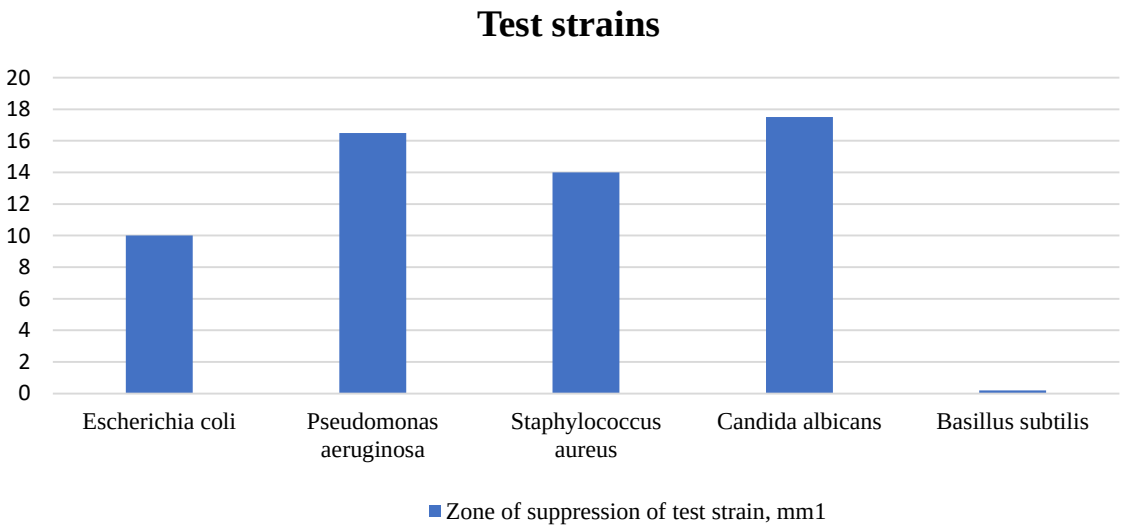

Table 2

№	Test strains	Zone of suppression of test strain, mm1
1	Escherichia coli	10
2	Pseudomonas aeruginosa	16,5
3	Staphylococcus aureus	14
4	Candida albicans	17,5
5	Basillus subtilis	0

Note: Values are the average of the two measurements

Photo 1. Antimicrobial activity of the plant collection sample to E. coli. Escherichia coli (E. coli) is a bacterium

Photo 2. Antimicrobial activity of the plant collection sample to Ps. aeruginosa. Pseudomonas aeruginosa is a

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commonly found in the lower intestines of warm–blooded organisms. Most strains of E. coli are harmless, but some strains can cause severe food poisoning.

species of Gram–negative aerobic motile bacteria. It lives in water and soil, is conditionally pathogenic for humans, and causes nosocomial infections in humans. Treatment is difficult because of high resistance to antibiotics.

Photo 3. Antimicrobial activity of the plant collection sample to B. subtilis. Hay bacillus (lat. Bacillus subtilis) is a species of Gram–positive spore–forming facultatively aerobic soil bacteria.

Photo 4. Antimicrobial activity of the plant collection sample to C. Albicans. Candida albicans (Latin) is a diploid fungus (a form of yeast–like fungi) capable of mating, but not in meiosis form, the causative agent of opportunistic human infections that are transmitted by mouth and genitalia.

Photo 5. Antimicrobial activity of the plant collection sample to S. Aureus. Staphylococcus aureus (lat. Staphylococcus aureus) is a species of globular gram–positive bacteria of the Staphylococcus genus. Approximately 25–40% of the population are permanent carriers of this bacteria, which can persist on the skin and mucous membranes of the upper respiratory tract.

It was found that a sample of anti–inflammatory herbal collection showed antimicrobial activity against Staphylococcus aureus, Pseudomonas aeruginosa, Candida albicans and Escherichia coli. The diameter of the growth suppression zone was 14 mm, 16.5 mm, 17.5 mm, and 10 mm, respectively (Table 1). The test sample showed no antimicrobial activity against Basillus subtilis.

CONCLUSION

The anti–inflammatory plant collection showed antimicrobial activity against almost all test strains: Staphylococcus aureus, Pseudomonas aeruginosa, Candida albicans and Escherichia coli. Antimicrobial activity against Basillus subtilis in the sample (anti–inflammatory plant collection) was not detected.

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