

## ANTIMICROBIAL ACTIVITY OF AQUEOUS EXTRACTS OF CONIFEROUS PLANTS AND POSSIBLE WAYS OF DELIVERY OF CONIFEROUS PLANT ELEMENTS INTO THE BODY

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The beneficial property of conifers to release phytoncides makes the air free of pathogens. This property is the basis of numerous studies on the antimicrobial efficacy of various conifer extracts.

Practical medicine in upper respiratory tract infections prescribes antimicrobial therapy, but its use causes negative consequences. Drugs depress the symbiotic microflora of the body, the use of antibiotics leads to resistance of pathogenic bacteria, in addition, possible side effects of treatment.

This caused the need not so much to search as to identify in the experience of folk medicine the most effective, but more gentle pharmacological means. Phytoncides emitted by coniferous plants are the initial components for the formation of biologically active substances - immunostimulants. Besides, therapeutic properties of coniferous natural massifs and plantations have long been effectively used in sanatorium-resort treatment of various diseases of respiratory tract (asthma, COPD), cardiovascular system, musculoskeletal system.

The aim of the work is the main approaches to the study of the peculiarities of antimicrobial activity of aqueous extracts of coniferous plants in modern science; the use of innovative methods of delivery of aqueous extracts of coniferous plants to the affected organ.

Retrospective analysis of scientific medical literature and collections of non-traditional (folk) medicine, encyclopedias of medicinal plants from different regions of the world shows the active and widespread use of medicinal plants in one or another form for the treatment of numerous diseases, syndromes and conditions.

In particular, it is noted that preparations with antibacterial properties based on plant materials have anti-inflammatory, antimicrobial, styptic, laxative and diuretic actions, can reduce blood pressure, relax smooth muscles, treat acne (acne), used for mouthwash in dental practice and in the treatment of throat infections, in the form of lotions for the treatment of purulent wounds and boils, etc.

Medicinal plants serve as a source of obtaining medicinal plant raw materials in the form of powders and infusions, exported to other countries, used in pharmaceutical production for the manufacture of drugs of plant origin.

Pine forests occupy huge areas in the countries of the former USSR, making up 19.5% of the total area of the coniferous forest zone of the European part and Siberia. Pine has spread widely due to its ability to grow on different soils. Pine is found in the mountain forests of Central Asia.

The study of antibacterial properties of coniferous plants is traditional in areas where coniferous natural arrays are widely distributed.

Companies engaged in logging are concentrated in the Siberian Federal District. Extraction of commercial tree species in this region is highly developed. Tree trunks are of industrial value,

and green coniferous mass is waste. Specialists faced the task of waste-free logging and utilization of green mass in agriculture.

Aqueous solutions with pleasant taste without bitterness were obtained by the method of extraction of pine needle green mass at different temperature regimes and experimental time. The important point of this study is the possibility of processing conifer pulp into a complete product or dietary supplement with high content of easily assimilable magnesium, potassium, calcium, manganese, iron, zinc and copper.

The second point of this study is the antibacterial properties of pine needles as a natural source of health improvement or prevention of diseases of various genesis.

The authors of this study note that waste from the processing of forest raw materials is a valuable source of macro- and microelements, promising for the production of biologically active additives.

Scientific literature devoted to the research of antibacterial properties of plants, including conifers, uses a visual laboratory experience of sowing microorganisms, fungi, bacteria in a nutrient medium (Petri dish with agar-agar), observation of a control "pure" sample and a sample with an aqueous extract of coniferous plants. At the first stage there is a visual counting of the area of contamination of samples using microscopes, followed by a detailed analysis of the antibacterial properties of conifers and their effect on different cultures.

Microorganisms such as viruses, bacteria, parasites or fungi play a vital role in wound healing, affecting the risk of infection, healing time, patient recovery time and health care costs. Overuse of antibiotics causes microbial resistance to antimicrobial agents and becomes a major challenge in providing effective patient care. Hence the challenge of developing new antimicrobial agents - potential substitutes for synthetic antibiotics. And if everything is clear with tinctures and pills for oral intake, then external application in the form of lotions and bandages causes unhealthy skepticism of patients and doctors, complicating procedural measures.

The main properties of hydrogels in medical practice are their inertness to healthy tissues. Hydrogels are successfully used in cosmetology, in the manufacture of breast endoprostheses, "smart" capsules in pharmacology, and hydrogel dressings are used to treat wounds of various genesis.

Hydrogels as a contact wound dressing come in different forms: amorphous (almost 100% water, taking the shape of the wound), semi-liquid and dry. They all have the ability to absorb or release moisture.

Treatment and prevention of purulent wounds are still relevant for surgery: intravenous (traditional) administration of antibiotics causes systemic damage to the body. Surgeons use hydrogel dressings with delayed release of antimicrobial agents. Hydrogel liquid dressings with antibacterial properties have proven themselves in the treatment of extensive infectious wounds: rapid reduction of local signs of infection, decrease in the amount of wound discharge, appearance of granulation and epithelization earlier than expected.

One of the main applications of polymeric hydrogel is drug delivery, where hydrogel networks can be used as a system for a controlled process of isolating the focus of infection from healthy tissues with targeted effects on microorganisms. Consequently, antimicrobial agents including antibiotics, nanoparticles and metal compounds as well as other organic compounds such as conifer extracts can also be incorporated into hydrogel networks that act as matrices to create multi-component hydrogels with antimicrobial activity.

Hydrogels based on chitosan (cationic polysaccharide) are non-toxic, biocompatible and biodegradable. Chitosan has antimicrobial properties and independently destroys the elastic molecular structure of bacteria. Chitosan molecules easily participate in the processes of organization of cross-linked molecules, the same properties have hyaluron. It is hypothetically possible to use peptides that stimulate tissue regeneration and attach antibacterial elements of coniferous plants to them at the molecular level as a basis for hydrogel dressing.

The authors of the article suggest that it is possible to use the antibacterial properties of aqueous extracts of coniferous plants in hydrogels to produce antiseptic dressings as an alternative to antibiotic dressings of synthetic origin. Hypothetically, wound dressings made of hydrogels with coniferous plant molecules can be used as first aid in households for burns, abrasions and cuts. It is possible to produce patches similar to those containing colloidal silver.

Phytoncides - antibiotics of natural origin, having the ability to inhibit the growth and development of microscopic fungi, spores, protozoan microorganisms, kill them and remove them from the body. The mechanism of action is exclusively natural (natural) in nature.

### Conclusion

According to the studied scientific literature of the last period, it is clear that antibacterial properties of coniferous plants have been known to mankind for a very long time. Mentions of aqueous extracts of coniferous plants are found in many treatises of medical care of different epochs and regions. Modern science turns to natural antibacterial agents as an alternative source of fighting numerous infections that do not cause resistance like antibiotics of synthetic origin.

Numerous studies, from the most rudimentary, which can be carried out in unequipped laboratories, to large-scale studies, show the exceptional properties of conifers and their promise for the pharmaceutical, food and agricultural industries.

Aqueous solutions of coniferous plants have antibacterial properties, their use has practically no contraindications, it is possible to use biologically active substances of coniferous plants in the form of food, drinks, as well as a means of external application.

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