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BIOSYNTHESIS OF SILVER NANOPARTICLES USING LIQUID EXTRACT JUNIPERUS COMMUNIS L. AND DETERMINING ANTIMICROBIAL ACTIVITIES

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Abstract: On the basis of the developed technology, a liquid extract from the coniferous plant Juniperus communis L. was obtained. Under laboratory conditions, we studied the antimicrobial effect based on the extract of the plant Juniperus commonus L. under the influence of silver nitrate: cell titer test of microorganisms 10^5 KOE/мл и 10^9 KOE/ml sample with silver nanoparticles showed high antimicrobial activity against Candida albicans, the diameter of the growth inhibition zone was 26 and 21 mm, respectively.

Keywords: liquid extract of Juniperus communis L. needles, silver nanoparticle, microbiological activity of silver nanoparticles.

Introduction

One of the important aspects recently developed in the field of nanomedicine is the use of drug delivery systems using nanoparticles, which open up the possibility of using innovative approaches to treatment. Nanotechnology as a scientific basis for the development of delivery systems is very promising in the case of drug delivery. Due to their small size, drug delivery nanosystems are promising tools for targeted therapeutic approaches. [1]

Nanotechnology is a set of principles, methods and technologies developing at the atomic, molecular or macromolecular level, aimed at creating and using structures, methods and systems for modifying objects and / or their components on a scale of 1-100 nm, with fundamentally new properties and functions.

Silver ions make it impossible for many chemical reactions to occur inside bacteria, and therefore many bacteria do not multiply in the presence of silver nanoparticles.[5] The so-called gram-negative bacteria, which cannot be stained by the Gram method (E. coli, salmonella, etc.), are most sensitive to the action of silver nanoparticles.

Silver, among metals, has the strongest bactericidal effect, and the modification of the structure of silver using nanotechnology will make it possible to present the unique properties of this metal in a new quality. [4,6]

Silver nanoparticles and silver carriers can be used in the treatment of diabetic wounds in case of reinfection of infections. These nanoparticles will help diabetics heal wounds that heal with minimal scars. Silver nitrate is a common antibacterial drug used in the treatment of chronic wounds.

Silver kills approximately 650 different disease-causing microorganisms. Silver jewelry was widely used in the treatment of infections in burns, open wounds and chronic ulcers. Silver nanoparticles are used as a biocidal additive - in the form of a modifier intended for the creation and production of new materials, coatings and other types of products with biocidal properties of a wide spectrum of action. [2]

Silver in ionic form has a bactericidal, pronounced antifungal and antiseptic effect and serves as a highly effective disinfectant against pathogenic microorganisms that cause acute infections. In addition, in recent years, increased interest in silver is explained not only by its powerful antibacterial and antiviral properties, but also by its revealed action in the body as a trace element.[3]

The aim of this work is to obtain silver nanoparticles from a liquid coniferous extract of Juniperus communis L. Determination of

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antimicrobial action based on nanoparticles with an extract of the plant Juniperus commonus L.

Materials and methods. Coniferous branches of Juniperus communis L. (Uzbekistan, Tashkent) were used as plant raw materials, and 70% ethyl alcohol was used as an extractant, and 0.01 M silver nitrate was used as a source of silver ions.

Experimental part. Biologically active substances were extracted from plants by extraction in 70% ethanol solution.10 g of finely chopped needle-shaped leaves were poured into the needles with 100 ml (70% ethyl alcohol + 30 ml of suv) mixture, heated at 60 C for 60 minutes. The temperature of the solution was reduced to room temperature and defended for 24 hours. After that, the filter was filtered through a paper filter. To the solution was added 10 ml of a 0.01 N solution of silver nitrate. The mixture was mixed for 20 minutes. The solution was left for a day.

Then, silver nanoparticles were isolated in a centrifuge of 3000 rpm for 5 minutes. Juniperus commonis L silver nanoparticles appear as a dark brown liquid.

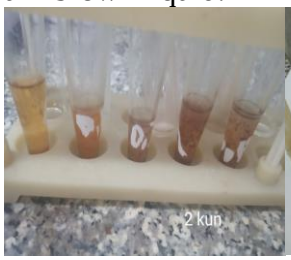

Figure-1. Initial view

Figure-2. Last view

Determination of antimicrobial action - silver nanoparticles obtained on the basis of an extract of the plant Juniperus commonus L. under the influence of silver nitrate was carried out by diffusion into agar in relation to some species of bacteria; Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus and the fungus Candida albicans (SF XX1, part one page 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. The determination was carried out by diffusion in agar on a solid nutrient medium.

Cultivation conditions of test microorganisms for inoculum preparation

Microorganism	Nutrient medium	Incubation temperature	Incubation time of crops
Escherichia coli *Pseudomonas aeruginosa* *Staphylococcus aureus*	Nutrient agar (Himedia), Mueller Hilton agar (TM Media)	32.5 ± 2.5 °C	18 to 24h
Candida albicans	Saburo - agar (Himedia) Mueller Hilton agar (TM Media)	22.5 ± 2.5 °C	44 to 52h

Preparation of the inoculum

The grown cultures of test bacteria strains were washed off the surface of the agar slant with sterile 0.9% isotonic sodium chloride solution. Using the domestic standard of turbidity, the titer of the cells, the test strains of opportunistic bacteria and fungi were diluted with saline to 10^5. To wash off fungal conidia, 0.9% sodium chloride solution was used.

Experiments.

Molten nutrient medium in a volume of 25 ml for bacteria Nutrient agar (Himedia), Mueller Hilton agar (TM Media), for mushrooms Sabouraud agar (Himedia) was poured into Petri dishes set on tables with a strictly horizontal surface. The cups were dried in a laminar flow hood. The bacterial suspension was inoculated onto agar by immersing a sterile cotton swab in the suspension of the test microorganism, removing the excess suspension by squeezing the swab against the walls of the tube. To obtain a uniform lawn, the inoculum was evenly streaked over the entire surface of the agar. A sterile metal cylinder, 0.6 cm in diameter, punched holes on the agar. Equal volumes of 100 µL of the test sample were added to the wells of each dish.

The antimicrobial activity of the sample was determined with the titer of cells of opportunistic microorganisms 105 and 109.

Results and discussion:

After adding the test sample, the cups were kept in the refrigerator for 3-4 hours. Then the dishes were incubated in a thermostat at a temperature

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of 360C for 16-18 hours for bacteria, at a temperature of 250C for 48-72 hours for mushrooms. It was experimentally established that a sample with silver nanoparticles has antimicrobial activity at a cell titer of test microorganisms in both 109 and 105 CFU / ml (Table 1), the diameter of growth inhibition zones at a cell titer of 109 CFU / ml. Compiled for Escherichia coli 10 mm, Pseudomonas aeruginosa and Staphylococcus aureus 14 mm, for Candida albicans 21 mm.

2 - silver nanoparticles

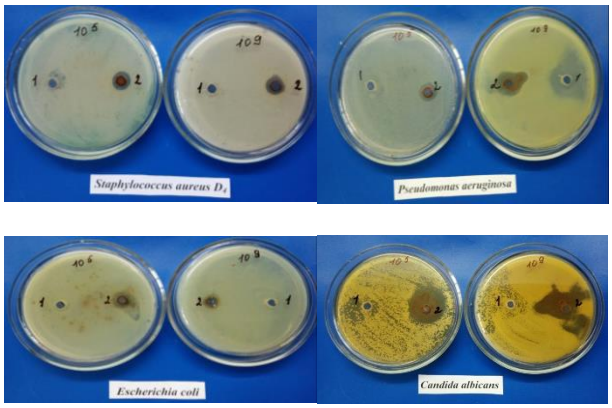

Figure- 3 . Results antimicrobial activities silver nanoparticiles with liquid of the extract Juniperus commonis L.

Table - 1

No.	Test strains	Zone, mm	
		10 ⁹ CFU / ml	10 ⁵ CFU / ml
		Silver nano particles	Silver nano particles
one	*Escherichia coli*	10	12
2	*Pseudomonas aeruginosa*	14	16
3	*Staphylococcus aureus*	14	18
four	*Candida albicans*	21	26

Conclusion: The analysis data confirmed that at a cell titer of 105 CFU / ml and 109 CFU / ml, the sample with silver nanoparticles showed high antimicrobial activity against Candida albicans, the diameter of the growth inhibition zone was 26 and 21 mm, respectively.

Overall , it can be concluded that silver nanoparticles can be a promising raw material for the production of drugs with antibacterial and antioxidant properties and use for scientific purposes for the development of liposomal compositions and its dosage form can be used to create dosage forms for articular disease.

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