

BIOLOGICAL SCIENCES

ANTIMICROBIAL ACTIVITY OF THYMUS SERPYLLUM ESSENTIAL OIL

Hayrapetyan S.

*PhD of Chemistry, Goris State University,
Goris, Armenia*

Abstract

The antimicrobial activity of *Thymus serpyllum* essential oil against standard strains *Staphylococcus aureus* ATCC 29213 and *Escherichia coli* ATCC 25922 was studied using the disk diffusion method. The results obtained indicate the presence of antimicrobial activity of *Thymus serpyllum* essential oil against the selected strains. A possible target for the antimicrobial action of this essential oil is the bacterial cell wall, which is fundamentally different in structure between gram-positive and gram-negative bacteria. The data obtained indicate the presence of antimicrobial activity against all strains of microorganisms and, to the greatest extent, against staphylococci.

Keywords: essential oil, antimicrobial activity, *Thymus serpyllum*.

Introduction.

Currently, a huge number of microorganisms pose a threat to human life and health due to the widespread prevalence of multidrug resistance. One of the reasons is the massive use of antimicrobial drugs, which in some cases leads to undesirable consequences, such as the formation of cross-resistance. In this regard, a search is underway for new drugs that have antimicrobial activity and are free of side effects. Recently, there has been increased interest in essential oil plants with antimicrobial activity [1]. Such plants include *Thymus serpyllum*. On the territory of Armenia, the plant grows wild. Herbal preparations from the herb *Thymus serpyllum* have various properties, including antiseptic. *Thymus serpyllum* essential oil is widely used in alternative medicine. Literary sources mention the pronounced antimicrobial, fungicidal action of *Thymus serpyllum* [2]. However, in the available literature we have not found information about studying the antibacterial activity of *Thymus serpyllum* essential oil growing in the Goris region of Armenia [3].

The collection of raw materials was carried out on the slope of old Khndzoresk, Goris region. Samples for studies were collected in the second ten days of June 2022, in the full flowering phase. The collection, preparation of raw materials (drying to an air-dry state) and the extraction of essential oil (hydrodistillation method) were carried out using generally accepted methods [4].

The crushed herb (30 g) was placed in the 1000 ml round-bottom flask, 300 ml of purified water was added and closed with a rubber stopper with a reflux condenser. The flask with its contents was heated on a heating mantle and boiled for two hours. After the distillation was completed and the device was cooled to room temperature, the resulting essential oil was collected from the receiver into a test tube.

500 µl of the suspension was evenly distributed over the surface of Mueller-Hinton agar to obtain uniform growth. Under sterile conditions, empty sterile 6.0 mm diameter disks were soaked in 50 µl of essential oil and placed on the surface of the inoculated agar. A standard gentamicin disk was used as a reference control. The dishes were left for 30 minutes at room temperature and then placed in a thermostat for 24 hours.

The growth retardation zone was measured using a ruler.

The statistical description of the results included indications of the arithmetic mean and standard deviation from its value, as well as the reliability of the differences between the found values of the arithmetic means.

Results.

When studying the antimicrobial activity of essential oil using the disc diffusion method, the following results were obtained (table).

Table

Antimicrobial activity of creeping thyme essential oil using the disc diffusion method

Test culture	Diameter of growth retardation zone, mm	
	Creeping thyme essential oil	Gentamicin
<i>Staphylococcus aureus</i> ATCC 29213	30	27
<i>Escherichia coli</i> ATCC 25922	8	8

From the above results it follows that the oil had antibacterial activity against all strains taken into the experiment. The greatest antimicrobial activity was observed against *Staphylococcus aureus*.

Discussion.

The results obtained indicate the presence of antimicrobial activity of creeping thyme essential oil against the tested strains. It can be assumed that a possible target for the antimicrobial action of this essential

oil is the bacterial cell wall, which, as is known, is fundamentally different in structure in gram-positive and gram-negative bacteria.

The cell wall of gram-negative bacteria contains a powerful lipid layer on the surface, interacting with which essential oils lose their antimicrobial activity. In this regard, it is of interest to further study the antistaphylococcal activity of creeping thyme essential oil with

the determination of the minimum inhibitory concentration.

References

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