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SUSCEPTIBILITY OF MICROORGANISMS TO CERTAIN FOOD ADDITIVES

Salomova F. I.
Akhmadalieva N. O.
Abdukadirova L. K.
Sadullaeva Kh.A.
Toshmatova G.A.
Alfraganus university
Tashkent State Medical University

Abstract
In this work, the sensitivity of microorganisms to a number of traditional food additives used in Uzbek national cuisine is studied: coriander, zhambil, black cherry seed extract (sedana) and barberry. The study was conducted in vitro using the disco diffusion method. The object of the study was 17 groups of microorganisms classified into gram-positive cocci, Gram-negative rods and fungi. The results showed that all the studied additives exhibit antimicrobial activity to varying degrees, depending on the concentration. The most pronounced bacteriostatic effect was found in extracts from "barberry", while "Coriander" had an effect mainly on the coccoid flora. The additive "zhambil" showed activity against cocci and gram-negative rods, but proved ineffective against fungi of the genus Candida. Thus, the investigated food additives can be considered as potential natural antimicrobial agents.

Keywords: Antimicrobial activity, Food additives, Coriander, Zhambil, Black cherry seed extract (Sedana), Barberry, Disk diffusion method, Gram-positive cocci, Gram-negative rods, Candida, Natural preservatives, Bacteriostatic effect, In vitro, Traditional medicine

Relevance

Over time, many different food additives have been created to meet the needs of the large food industry. These substances are introduced into the composition of products to ensure their safety and maintain quality at all stages – from production or industrial kitchens to storage in warehouses, sale in stores and, eventually, receipt to the consumer. In addition, additives are used to improve the organoleptic characteristics of food, such as taste, aroma, consistency and appearance.

The use of probiotics in the form of food products, biologically active additives and medicines has long been of interest to mankind [1-12]. In recent years, the issue of

their effectiveness and appropriateness of use in the prevention and treatment of various pathological conditions has been actively discussed in the scientific literature [12].

The purpose of the study. To study the sensitivity of microorganisms to certain food additives in vitro.

The research method. We tested the sensitivity of 17 groups of microorganisms (taking into account their frequency of occurrence in the gastrointestinal tract), which can be conditionally divided into 3 groups: gram-positive cocci, gram-negative rods, mushrooms.

Sensitivity to 4 types of food additives used in Uzbek national cuisine was studied for all groups of microorganisms: Coriander, zhambil, black cherry seed extract and barberry.

The sensitivity of microorganisms in vitro to any chemical preparations is usually determined in two ways: by diffusion into agar using paper discs saturated with the test substances and by serial dilution of the chemical in a dense or liquid nutrient medium, and in most cases preference is given to the disco diffusion method as more convenient, simple, economical and accurate.

The results of the study. For the research, fresh (24-hour) cultures of the studied microorganisms were used, on which a disk soaked in an aqueous extract of the studied food additives in various concentrations (10, 30, 50%) was applied. The Petri dish was closed and placed in a thermostat at 37 ° C for 24-48 hours. After the incubation period, the cups were removed from the thermostat, the microbe growth retardation zone was measured with a special ruler and expressed in mm.

Studies have shown that the higher the concentration of food additives, the greater the effect on microorganisms.

The dietary supplement Kashnich had an inhibitory effect on the growth of 13 out of 17 groups of microbes. The most significant effect was observed in relation to all types of cocci; no effect was found on gram-negative rods and mushrooms.

The food additive "zhambil" had a significant effect on both pyogenic cocci and gram-negative microbes, but fungi of the genus Candida turned out to be insensitive to it.

Sedana dietary supplement had an effect on almost all groups of microbes, except for fungi of the genus Candida, but its effect is less pronounced compared to zhambil.

The extract obtained from bark archa had a bacteriostatic effect on 14 groups of microbes out of 17, with the most pronounced effect noted in relation to Pseudomonas,

group D streptococcus and proteus. Mushrooms, bifidobacteria and lactobacilli were not sensitive to the "barberry".

Discussion

The findings of this study highlight the antimicrobial potential of traditional food additives commonly used in Uzbek cuisine. The use of natural substances such as coriander, zhambil, black cherry seed extract (sedana), and barberry demonstrates varying degrees of effectiveness against a wide range of microorganisms, including Gram-positive cocci, Gram-negative rods, and fungi.

Coriander exhibited selective antimicrobial activity, predominantly inhibiting the growth of Gram-positive cocci. This suggests that its bioactive compounds may have a specific mechanism of action targeting the cell walls or metabolic pathways of coccoid bacteria. However, the absence of activity against Gram-negative rods and Candida fungi limits its application as a broad-spectrum antimicrobial agent.

Zhambil, on the other hand, showed a broader spectrum of activity, effectively suppressing both Gram-positive cocci and Gram-negative rods. This indicates that zhambil may contain more diverse or potent antimicrobial components capable of penetrating the more complex outer membrane of Gram-negative bacteria. Its ineffectiveness against Candida fungi, however, suggests that antifungal compounds may be lacking or insufficient in concentration.

The black cherry seed extract (sedana) demonstrated moderate activity across almost all microbial groups except for Candida. While its antimicrobial spectrum is relatively wide, the degree of inhibition was less pronounced compared to zhambil, indicating that sedana may be more suitable as a complementary antimicrobial agent rather than a primary one.

Notably, the barberry extract (presumably derived from juniper bark) exhibited the strongest overall antimicrobial activity. Its significant effect against Pseudomonas, group D streptococci, and Proteus species suggests that it contains highly potent bacteriostatic compounds. Nevertheless, its lack of activity against beneficial gut flora, such as Lactobacillus and Bifidobacterium species, may be advantageous in preserving the natural intestinal microbiota while targeting pathogenic organisms.

Another important finding is the concentration-dependent efficacy of all tested additives. The larger the concentration of the aqueous extract applied, the greater the inhibition zones observed. This reinforces the importance of dose optimization in potential therapeutic or preservative applications.

Although promising, the in vitro nature of this study limits direct conclusions about clinical efficacy or safety. Further in vivo studies, toxicological assessments, and

investigations into the active chemical constituents of each additive are necessary before recommending their use in food preservation or medical applications.

Conclusion

The study showed that traditional food additives, widely used in Uzbek cuisine, have pronounced antimicrobial properties. The extract from juniper bark demonstrated the greatest activity in vitro, which had a bacteriostatic effect on most of the studied microorganisms. The additives kashnich, zhambil and sedana also showed antimicrobial activity, mainly against Gram-positive cocci and some Gram-negative rods.

It has been revealed that the effectiveness of food additives directly depends on their concentration: the higher the concentration of the aqueous extract, the greater the zone of inhibition of microbial growth. At the same time, fungi of the genus Candida, as well as some representatives of the intestinal flora (lactobacilli and bifidobacteria), proved to be resistant to most of the additives studied.

The results obtained indicate the possibility of using natural ingredients of the national cuisine as potential antiseptic and bacteriostatic agents, which can be used both in the food industry and in preventive medicine. However, additional research is needed for practical implementation, including in vivo trials and long-term safety assessment.

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