MICROBIOLOGICAL METHODS FOR THE QUALITY
OF DRINKING WATER MONITORING

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Introduction. Drinking water is water that is meant for daily unlimited and safe consumption by humans and other living beings. Its main source is natural water, which is subjected to purification and disinfection, passes the required stages of water treatment and water purification, which are necessary to obtain technical first, and then tap water. The main factors of drinking water pollution are microbiological, heavy metals and toxic substances, nitrates and pesticides. The problems of drinking water pollution can be solved by using modern biotechnological methods of purification. These include: bio-cleaning, the use of ion-exchange resins, modern biofilters. The drinking water biotechnological purification is the newest approach to protecting and human health promotion, as well as maintenance of environment.

Aim. To study the basic standards and methods for the drinking water microbiological quality monitoring, which are used in Ukraine.

Results and discussion. According to regulatory requirements, the main drinking water quality indicators include mechanical pollution, organoleptic objectives (including chemicals that affect the water or anoleptic properties),toxicological and epidemiological indicators (bacteriological, virological, parasitic contamination).Currently in Ukraine, the quality of water in centralized drinking water supply is regulated by the Laws and documents: "On ensuring sanitary and epidemiological welfare", "On Drinking Water and Water Supply", GSanPiN 2.2.4-171-10 "Hygienic requirements for drinking water, intended for human consumption".

Microbiological contamination of water arises from the unusually large number of microorganisms appearance in the environment. They can enter to the water supply system with wastewater the poor-quality filters usage. The microbial and viral drinking water contamination is very dangerous for human health, so bacterial and viral strains can cause salmonellosis, cholera, typhoid fever, dysentery, poliomyelitis, gastroenteritis, hepatitis A, etc.

According to normative documents, in Ukraine the drinking water epidemiological safety main microbiological indicators are: the total microbial count, the presenceof E. coli group bacteria, pathogenic Salmonella, Shigella, Enterococcus, somatic coliphages, enteroviruses, adenoviruses, rotavirus, reoviruses, Hepatitis A

virus antigens. According to epidemiological indications, tap water is tested for the Vibrio cholera presence.

Of the total microbial count determination is carried out by the method of deep inoculation into nutrient agar and all microorganisms visible colony calculation at a 2-5 fold increase that grew in the agar thickness and surface at $(36 \pm 1)°C$ for(24 ± 2) h or at $(22 \pm 1)°C$ for (48 ± 2) h.

Detection of the E. coli group bacteria is carried out by a membrane filtration method when a certain volume of water is passed through a 0.45 micrometers filter, which is incubated at $(36 \pm 1)°C$ for 24 h on Endo medium. Then the number of bacteria is count. A titration method (the most probable number) can also be used, in which the volume of tested water is inoculated into a storage medium (glucose-peptone, lactose-peptone), incubated at $(36 \pm 1)^0C$, inoculated Endo medium and identified the grown bacteria.

The Salmonella detecting method consists in drinking water samples concentrating, two different nutrient media (selenite broth and magnesium medium) using preliminary and elective enrichment, inoculation on differential diagnostic media (Endo and Ploskirev) and microorganisms identification according to biochemical, serological properties and Salmonella O-bacteriophage sensitivity.

To Shigella testing the bacteria concentrating or accumulation in enrichment media (selective and bile broth), inoculation on differential-selective media (Endo, EMC-agar, Ploskireva, McConkey medium), followed by microorganisms identification by biochemical and serological characteristics is used.

The determination of coliphages, depending on the drinking water purity degree, occurs in a titration method (the coliphage accumulation in liquid nutrient media and the *E.coli* test culture lysis zones on nutrient agar detection) or by a more rapid direct method (direct inoculation by a single-layer agar method and the lysis zones on the test culture lawn counting).

Conclusions. Today the one of the main problems is the drinking water contamination, because it is necessary for human life, because the human body consists of 70% of water and is a source of various minerals and macroelements.

Biotechnological approaches for improving the drinking water quality are the use of new ion exchange and silt filters, new methods of coagulation and sedimentation, the quality monitoring methods employment.

At the Department of Biotechnology in cooperation with bacteriologists from the SI «Kharkiv regional laboratory center of Ministry of health of Ukraine» the centralized water supply sources drinking water quality in the city of Kharkov is investigated using microbiological control methods. The obtained results can be used in the formulation of recommendations on biotechnological treatment of drinking water from contamination.