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akademiyasi  
«Yosh olimlar tibbiyot  
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## HYGIENIC CHARACTERISTICS OF DRINKING WATER SUPPLY OF THE URBAN POPULATION

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**АННОТАЦИЯ.** *Представлены результаты анализа обеспеченности жителей города Ташкента доброкачественной питьевой водой. Из водозаборных сооружений вода подается в разводящую сеть после разных методах водоподготовки, и она соответствует требованиям ГОСТ «Вода питьевая» 950-2011 [1]. Предложен вариант ретехнологизации системы водоснабжения за счет повышения качества воды с помощью рассмотренных технологий водоподготовки. Выполнена оценка качества воды источника водоснабжения поверхностных (р. Бозсу) вод, а также предложены варианты технологий подготовки воды из этого водоисточника. Для обработки воды р. Бозсу предложено три варианта реагентных технологических схем. Это основные методы очистки питьевой воды – осветление, обесщелачивание и обеззараживание питьевой воды.*

**Ключевые слова:** *водопровод, отстойники, фильтры, хлорирование, обеззараживание, сеть, водоисточник, кишечные инфекции, коагулянт, органолептика*

## ГИГИЕНИЧЕСКАЯ ХАРАКТЕРИСТИКА ПИТЬЕВОГО ВОДОСНАБЖЕНИЯ ГОРОДСКОГО НАСЕЛЕНИЯ

**АННОТАЦИЯ.** *Тошкент шаҳри аҳолисини сифатли ичимлик суви билан таъминлаш таҳлил натижалари тақдим этилган. Сув олиш қурилмаларидан олинган, турли усуллар ёрдамида тозаланган сув водопровод тармоғи орқали аҳолига етказиб берилади ва у ДавСТ 950-2011 “Ичимлик сув” талабларига тўлиқ мос келади [1]. Сувни тозалаш технологиясини қўриб чиқиш ёрдамида сув сифатини ошириш ҳисобига сув таъминоти тизимларини ретехнологизация вариантлари таклиф этилган. Очиқ сув таъминоти манбалари сув (Бозсу дарёси) сифатини баҳолаш, шунингдек мазкур сув манбасидан олинган сув сифатини яхшилаш вариантлари таклиф этилди. Бозсу дарёсидан олинган сувни қайта ишлаш учун реагентли технологик схеманинг учта варианты таклиф этилди. Бу сувни тозалашнинг асосий усуллари, яъни тиндириш, рангсизлантириш ва зарарсизлантиришидир.*

**Калит сўзлар:** *водопровод, тиндиргичлар, фильтрлар, хлорлаш, зарарсизлантириш, тармоқ, ичак инфекциялари, коагулянт, органолептика*

## SHAHAR AHOLISINI ICHIMLIK SUVI BILAN TA'MINLASHNING GIGIYENIK XUSUSIYATLARI

**ANNOTATION.** *The results of the analysis of the provision of residents of the city of Tashkent with good-quality drinking water are presented. From water intake facilities, water is supplied to the distribution network after various methods of water treatment, and it meets the requirements of "Drinking water" GOST 950-2011 [1]. A variant of retechnologization of the water supply system by improving water quality with the help of the considered water treatment technologies is proposed. The water quality of the surface water supply source (the Bozsu River) has been assessed, and options for water treatment technologies from this water source have been proposed. Three variants of reagent technological schemes have been proposed for the treatment of the Bozsu River water. These are the main methods of drinking water purification – clarification, bleaching and disinfection of drinking water.*

**Keywords:** *water supply, settling tanks, filters, chlorination, disinfection, network, water source, intestinal infections, coagulant, organoleptics*

**Relevance of the work:** Water purification from man-made pollution is one of the most important and difficult tasks of our time. Drinking water – water of its quality in its natural state or after processing, intended for human drinking and household needs, or for the production of food products, must meet the requirements that are established by regulations. Unfortunately, it is becoming increasingly difficult to find clean natural water that is suitable for drinking. Natural reservoirs on the territory of Uzbekistan, which are used as a source of water supply, are characterized by high turbidity of waters, high color, as well as high average annual temperatures. There are two main problems in the supply of drinking water to the population – its quantity and quality. Drinking water requires not only knowledge about chemicals and impurities necessary for life, but also radical ways to purify water, especially from harmful substances. At water treatment plants, surface waters undergo traditional water purification technology. It includes reagent treatment, settling, clarification, filtration. Organic substances in the waters dramatically worsen the organoleptic characteristics of water, thereby causing various kinds of odors, increasing color, and having an adverse effect on the human body and animals. Kadyrinskaya water intake facil-

ity is one of the important sources of drinking water in Tashkent. It provides 78% of the population of the city of Tashkent with high-quality drinking water, in addition, it plays an important role as climate-forming components of the landscape, and has a great aesthetic purpose. In this regard, monitoring the state of an eco-friendly reservoir system is an urgent task. In this article, a scheme for water treatment of water for the drinking needs of the population will be considered.

### **The purpose of the study:**

To study the problems of drinking water supply of the population of large cities

Evaluation of the effectiveness of the Kadyrinsky head water supply facility

### **Tasks research:**

1) hygienic assessment of water sources of centralized water supply;

2) study of water purification technology;

3) assessment of water-related diseases in the population of Yunusabad district in 2020-2021;

4) develop recommendations for optimizing the provision of high-quality drinking water to the population

**Materials and methods:** The material for the article was scientific articles, publications published in scientific journals, educa-

tional literature, electronic resources. The article uses sanitary-hygienic, epidemiological, statistical research methods.

The assessment of the quality of large water bodies of the Republic of Uzbekistan showed that the concentration of difficult-to-oxidize organic pollutants, estimated by COD (chemical oxygen demand), increases to the South of the country.

According to the requirements of GOST (state standart) 950:2011 "Drinking water", it is necessary to provide the population with good-quality drinking water. One of the ways to reduce pollutants in the water, in particular organic, is the use of effective methods of water treatment.

The Kadyrinsky water supply facility was put into operation on August 19, 1969. This facility carries out an open water intake from the BozSu canal, through a discharge channel, providing 78% of the total demand of the city for drinking water. The initial capacity is 225 thousand m<sup>3</sup> per day.

To date, the capacity is 1,250,000 m<sup>3</sup> / day. The composition of the structures: settling tanks; reagent facilities; pumping stations; filtration station; chlorination station; clean water tank. The station has two settling tanks: I - the main settling tank with a capacity of 1 million m<sup>3</sup> / day (length - 1500m; width -250 m; depth - 8 m) and II - a backup settling tank with a capacity of 500,000 m<sup>3</sup>/ day (length-600m, width-5 m, depth-3m). The sump is being cleaned – by a dredger. A coagulant is used to lighten the water at the station. There is a reagent farm for the preparation of the solution. The structure of the cathode includes: a hopper for receiving, storing and dosing coagulant. There are four receiving bunkers and three wet storage tanks for coagulant. Metered coagulants are transferred to the displacement chamber. Filters of different capacities are used for water discoloration. There are 48 filters in total at the station. It is a rectangular reinforced concrete tank in which the filter loading is located. The filtration rate is 8 -10 m/hour. The total fil-

tration area is 6700 m<sup>2</sup>. The station has ten clean water tanks with a capacity of 50 – 100,000 m<sup>3</sup>/day of water. This device is cleaned once a year. Water comes into contact with chlorine on the tank.

**The results of our research** have shown that the quality and condition of water from water supply sources according to the main indicators meet the requirements of GOST (state standart) 950:2011. It is noted that the content of mineral substances in the water in almost all water areas of the Yunusabad district water supply source in Tashkent is normal. In Tashkent, the sources of water supply for biogenic elements are not proportional, as evidenced by the normalization of water content of calcium (40-50 mg/l), fluorine (0.5-1.2mg/l) and iodine (50-70mg/l).

When analyzing the number and structure of morbidity among the population of the Yunusabad district of Tashkent, the following results were obtained: in general, respiratory diseases are in the first place with morbidity (50.2%), gastrointestinal diseases are in second place (6.8%), and urinary tract diseases are in third place in a stable state (5.3%). In addition, the main types of diseases in the population are diseases of the musculoskeletal system, connective tissue diseases, diseases of the endocrine system, nutritional disorders, infectious and parasitic diseases, dental caries.

Our research has shown that among the population of the Yunusabad district of Tashkent, the first place among the diseases associated with drinking water consumption is occupied by non-communicable diseases - dental caries, the second place - diseases of the gastrointestinal tract, the third place - cardiovascular diseases, the fourth-place diseases associated with the urinary system, and the fifth place - patients with malignant tumors.

When comparing the specifics of morbidity of the population of the Yunusabad district of Tashkent, it is necessary to take into account the influence of environmental factors in



the region, including the quality of drinking water on morbidity rates.

Among the population, there is a statistical decrease in the incidence of primary allergic diseases ( $R < 0.05$ ), as well as a significant decrease in the exacerbation of allergic diseases ( $R < 0.05$ ) as a result of the consumption of drinking water supplied to the population centrally at the open Kadyrinsky head water supply facility

Observations over two years showed that the incidence of atopic dermatitis in the population decreased ( $R < 0.01$ ) in children with different water regimes as a result of consumption of centralized drinking water purified in open and closed reservoirs.

The study of the incidence of diseases of the gastrointestinal tract among the population consuming drinking water from both open and closed water supply facilities and drinking water from head water pipes in a centralized manner showed that chronic diseases of the gastrointestinal tract (gastroduodenitis, gastritis, colitis) remained unchanged -9%. At the beginning of the study, it was found that functional stomach disorders in the population, gallbladder dysfunction, unstable stools, are mainly detected in 15% of the population who consume water in a centralized manner of the Bozsu head water supply facility. It is likely that this situation is not related to the operability of the main structure of the structure, but to technical failures in the distribution network, cases of non-compliance of closed points with hygienic standards, and also due to the fact that the expiration of the service life of devices in the network

Depending on the composition of the source water used to provide the population of Yunusabad district with centralized drinking water, the incidence rates among the population living in these areas also differ, including in Yunusabad district, where the incidence falls mainly on the group of infectious diseases

associated with the waters of the gastrointestinal tract.

In many cases, there were changes in the biochemical analysis of blood in the population of Yunusabad district with signs of cholestase and cytolase ( $P < 0.05$ ) Of these indicators, ALT ( $45.2 \pm 2.2$  IU/L), AST ( $40.5 \pm 1.8$  IU/L), alkaline phosphatase ( $350 \pm 11.3$  IU/L), bilirubin ( $24.4 \pm 1.8$  mmol/l) cholesterol ( $5.8 \pm 1.4$  mmol/l) in children with hepatitis A, one third of whose parents have a history of gallstones, gout, deforming arthrosis.

The final results of ultrasound examination of the liver of the comparative group showed that the liver parameters remained unchanged ( $R > 0.05$ ).

Our studies have shown that the consumption of water that does not comply with sanitary and hygienic standards leads to the formation of metabolic disorders in the body and the manifestation of changes in oxaluria from the urinary system.

The main dental diseases detected in the population of Yunusabad district are periodontal disease and dental caries. The prevalence and intensity of dental caries depends on a number of factors, the main of which are the amount of fluoride in the water, climatic, geographical and social conditions. The main preventive measures for dental caries include the use of fluorides.

Water supply of settlements – protects human health. Studying the structure of the morbidity of the population, it can be concluded that one of the main factors causing their diseases is the discrepancy between the water they consume and the requirements of sanitary hygiene.

When analyzing the quality of drinking water consumed by the population of the Yunusabad district of Tashkent, it was found that poor-quality drinking water has an impact on the morbidity of the population. Samples are taken from the following points to determine the content of drinking water.

### Drinking water intake points of Yunusabad district (sampling points were determined among the population depending on the epidemiological situation in the area)

No	Sampling location	Number of samples	Selection points
1	Yunusabad district, street 7 School No. 41	100	Inside the building
2	Yunusabad district street 2 Kindergarden N 240	100	Inside the building
3	Chinabad Mahalla	100	From the yard
4	Mahalla shifokor	100	Inside the building
5	Mahalla Niezboshi yuli	100	From the yard
6	Shahristan Mahalla house 70	100	From the yard
7	Mahalla Bodomzor house 200	100	From the yard

The number of sampling points in the Yunusabad district of Tashkent was 108, samples were taken mainly from water supply networks in epidemiologically disadvantaged areas. The total number of samples taken from these points was 700. Samples are mainly ex-

amined for organoleptic, chemical, and bacteriological parameters. The organoleptic parameters of the samples taken from these points comply with the requirements of GOST (state standart) 950:2011.

### Bacteriological indicators of drinking water of Yunusabad district of Tashkent for the last two years (2020-2021)

N	Year	Indicators	Number of samples	+	-
1	2020	TMN	700	2	698
2	2021	TMN	700		700
3	2020	if- index	700	2	698
4	2020	if- index	700		700

*TMN – total microbial number*

The table shows that the bacteriological indicators obtained when supplying drinking water to residential areas of Yunusabad district comply with the norms of current legislation. The main reason for the deviation of the results by the number of pathogenic microorganisms

is not a decrease in the efficiency of sanitary facilities at treatment facilities, but the presence of secondary sources of pollution added along the way from treatment facilities to residential areas.

### Physical and chemical analysis of drinking water in Yunusabad district (2020-2021)

N	Indicators	Number of samples	2020 y	2021 y	MPC
1	Ammonia	400	0,00	0,00	0,01 mg/dm <sup>3</sup>
2	Nitrites	400	0,00	0,00	2-3 mg/dm <sup>3</sup>
3	Nitrates	400	7,32	6,65	45 mg/dm <sup>3</sup>
4	Sulfates	400	27,6	27,8	400-500 mg/dm <sup>3</sup>
5	Chlorides	400	5,0	5,13	230-250 mg/dm <sup>3</sup>
6	Iron	400	0,115	0,097	0,3 mg/dm <sup>3</sup>

*MPC – maximum permissible concentration*



Chemical indicators of the centralized drinking water supply system are evaluated mainly with complete and short sampling from the water supply. The indicators in the samples correspond only to the hygienic indicators of the current legislation on individual micro- and macroelements, including the technical and hygienic effectiveness of centralized treatment of the population of the Yunusabad district from local water supply, but deviations from the established norms arise due to technical malfunction of the devices.

According to the chemical analysis of the population from the centralized drinking water supply system, the amount of fluoride in the centralized water supply system in 2020-2021 was 0.2-0.3 mg/l, according to the samples taken. This indicator does not fully comply with the requirements of GOST (state standart) 950:2011.

When studying water-related diseases, the following indicators were studied in Yunusabad district:

General morbidity in the following areas:

1. Intestinal infections.
2. gallstone and kidney stone diseases
3. Hepatitis A.

In 2019, primary morbidity among children increased. This year, the overall incidence rate was 38 per 100 children, while in 2018 this figure was 22. The highest place in the structure of morbidity was occupied by diseases of the upper respiratory tract, the second place - diseases of the digestive system, the third place - diseases of the musculoskeletal system. Among adolescents in the last 2 years, diseases of the blood, circulatory system, and genital tract occupy a high place.

According to the authors, the traditional method of disinfection of water using chlorine reagents also has a negative impact on the health of children. Excessive use of various chlorine compounds and additives to neutralize pathogenic microorganisms in water leads to

the development of oncological and skin diseases in children.

## CONCLUSIONS

1. The indicators of centralized drinking water supply of the population of the Yunusabad district of Tashkent fully comply with the requirements of GOST (state standart) 950:2011 on chemical indicators, except for the amount of trace elements in the water.

2. It was found that the composition of the open water of the Bozsu does not meet the requirements of GOST (state standart) 951:2011 in terms of its organoleptic and bacteriological indicators in 2020, mainly due to the creation of private recreation areas around the Ugan River in the Tashkent region.

3. In 2020, the bacteriological indicators of water showed a result 3.8% higher than normal. This is due to the entry of harmful impurities into the water supply network from secondary sources of pollution.

4. Cases of diseases of the gastrointestinal tract, hepatitis A, non-communicable diseases (caries, fluorosis) have been identified among the population due to the entry of secondary pollutants into the centralized water supply system.

5. The most effective method of disinfection of drinking water without deterioration of its chemical composition, organoleptic properties is ozonation, but its expensive cost is the first obstacle to its use in a mass state.

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