

Improving the epidemiology, epizootology, and prevention of echinococcosis in Uzbekistan.

Sh.M.Rasulov¹, G.S.Matnazarova², A.Mirtazayev³, N.T.Xamzayeva⁴

¹ Rasulov Shomurod Mahmudovich, Tashkent Medical Academy, PhD student of the Department of Epidemiology, Tashkent, Republic of Uzbekistan.

² Matnazarova Gulbahor Sultanovna, Tashkent Medical Academy, Head of the Department of Epidemiology, Ph.D., Tashkent, Republic of Uzbekistan.

³ Mirtazaev Amanturdi, Tashkent Medical Academy, Professor of Epidemiology, Tashkent, Republic of Uzbekistan.

⁴ Khamzaeva Nilufar Toshtemirovna, Tashkent Medical Academy, Assistant of the Department of Epidemiology, Tashkent, Republic of Uzbekistan.

Abstract. Echinococcus (*Echinococcus granulosus*) is a parasitic disease that occurs in some mammals and humans, is transmitted orally, infects human parenchymal organs (liver, lungs, spleen, and various other organs), and is chronic, causing echinococcal vomiting. The Republic of Uzbekistan is an endemic area for echinococcosis. According to official data, the damage rate is 6-9 people per 100,000 population. The number of surgeries performed annually due to echinococcosis ranges from 1,000 to 1,500. The article provides an analysis of the prevalence of echinococcosis among humans and animals, the long-term (1994-2019) dynamics of echinococcosis among the population of the Republic of Uzbekistan, routes of transmission, infectious factors, epidemiological and epizootiological features.

Keywords: echinococcosis, cestodosis, endemic disease, perennial analysis, epizootology, epidemiology, prevention, anesthesia.

Introduction At a time when humanity has entered the 21st century, despite advances in science and technology, many infectious diseases are being recorded among the population in large numbers, and some are not completely eradicated. Complete elimination or further reduction of infectious diseases,

including echinococcosis in the population, depends on the level of knowledge of specialists working in the field of sanitary-epidemiology and their work.

According to the WHO, more than 16 million of the 50 million deaths worldwide are caused by infectious and parasitic diseases [4,23,24]. According to some data, more than 1 million people are currently infected with echinococcosis in the world, and in some endemic and nonendemic regions, the incidence of this disease varies more than 200 times, respectively. In recent decades, there has been an increase in the incidence of echinococcosis and an expansion of the geographical boundary of the disease [24,29].

Epizootology. Today, echinococcosis, one of the main cestodes of animals under the influence of environmental and anthropogenic factors in the world, is spread in more than 100 countries around the world and is a dangerous disease of epizootiological and epidemiological significance.

With echinococcosis in the United States 9.8% of sheep, 11.3% of dogs, in the Central Caucasus region of Russia, 35-50% of sheep, 25-100% of dogs, in Kazakhstan 33.1% of sheep, 68.7% of dogs, in Uzbekistan 15 sheep, 8% and 20% of dogs were reported to be affected [6,7,8].

Echinococcosis is particularly common in rural areas where sheep are raised, the main reason for which is the consumption of the internal organs of slaughtered sheep by dogs in those areas. This disease is very common in regions of the globe where dog meat is part of the human diet. For example, in some regions of Kenya, 20-50% of small and large horned animals are infected with parasitic diseases, which cause great damage to agriculture [10,15,19,20].

Because echinococcosis differs from other helminthiases in that it is asymptomatic, there is no clear data on the incidence of this disease. The disease is widespread in all regions of Uzbekistan and therefore our republic is an endemic area for echinococcosis [1,13,21].

According to M. Aminjanov (2003), the prevalence of echinococcosis among farm animals was 46.2% in cattle, 65.0% in sheep, 12.0% in goats, 35.0% in camels, 38.2% in donkeys and 24.3% in dogs. identified [6,7].

Another serious issue needs to be addressed. In dog shelters, dog feces are not collected, burned, or buried by deep digging, i.e., decontaminated. If dogs are infected with echinococcus, they leave litter in the yard, on the streets, in the fields, as a result of which the external environment, especially soil, grass, vegetables, greens, other crops, in short, all areas are contaminated with echinococcal eggs [10].

Epidemiology. Echinococcosis is widespread in many countries around the world. According to some estimates, more than 1 million people are currently infected with echinococcosis. In recent decades, there has been an increase in the incidence of echinococcosis and an expansion of the geographical boundary of the disease. In Tunisia, for example, surgery for echinococcosis accounts for 10% of all surgical interventions.

Due to the prevalence of the disease, international congresses on echinococcosis have been organized since 1951 (Uruguay). Given the importance of the problem, it was noted at the 54th session of the WHO in 2001 that the incidence of worm infestations was the third highest after AIDS and malignant tumors [24,30].

Even in countries that are sanitary-epidemiologically safe, echinococcosis can be a serious problem. In the United States, for example, about 100 new cases of echinococcosis are reported each year; 60% of cases are reported in immigrants. A similar situation is observed in Germany, Switzerland, Italy, Japan and other countries.

Echinococcosis is especially common in rural areas where sheep are raised. This disease is very common in areas where dog meat is used in human food (e.g. in some parts of Kenya).

To date, echinococcosis has not been reported only in Iceland and Greenland. Sporadic cases have been identified in New Zealand, Tasmania and Cyprus.

Echinococcosis remains a serious medical problem in Uzbekistan. Every year, one to one and a half thousand surgeries related to echinococcosis are performed in the country (Sh.I. Karimov, 1999), the number of which is growing from year to year.

The spread of echinococcosis occurs not only among the population engaged in animal husbandry, but also among the urban population: along with livestock breeders, shepherds, hunters, dog breeders and their family members, the population does not get in direct contact with animals. The increase in the incidence of echinococcosis in Moscow and the Moscow region is influenced by several factors: increasing migration of the population, deterioration of social living conditions, import of contaminated food from endemic sources, while reducing the level of sanitary-epidemiological control [18,23].

The purpose of the study. Improving the prevalence, epizootology, modern epidemiological features and measures to prevent echinococcosis in Uzbekistan.

Research materials.

1. Official reports of the Agency for Sanitary and Epidemiological Surveillance under the Ministry of Health of the Republic of Uzbekistan on echinococcosis in 1994-2019.
2. Reports of the Center for Sanitary and Epidemiological Peace of Tashkent in 2019 on parasitic diseases and official data on echinococcosis in 1998-2019. Data from the Department of Parasitology on helminthic diseases and control examinations.
3. Official reports of the Kashkadarya Regional Center for Sanitary and Epidemiological Peace on echinococcosis in 1999-2018. Data on medical histories of patients with echinococcosis and maps of epidemiological surveys conducted in echinococcosis outbreaks.

Research methods: Epidemiological, parasitological and statistical methods were used.

Epidemiological method. Retrospective epidemiological analysis of echinococcosis in the Republic of Uzbekistan, Tashkent city and Kashkadarya region D. It was performed using the method proposed by Belyakov and co-authors (1981). The calculation of morbidity was calculated by the compact method of the smallest squares, on the straight-line function $U_{t1} = a + vx$.

Statistical method. The obtained results were statistically processed according to the well-known methods of variational statistics. The statistical processing software was selected in accordance with the research goals and objectives. The mean error (m) of the indicators was calculated, and the reliability of the difference between the groups being compared was determined using the Student t-criterion. During the analysis, the numbers were processed using Microsoft Excel. The differences were assumed to be reliable at $p < 0.05$.

Research results and their discussion.

Although the measures currently being taken against echinococcosis have shown some effectiveness, they are not sufficient. This is evidenced by the fact that the disease is stable among the population of the country from year to year, and in most cases it is chronic and leads to unpleasant complications and disability.

The analysis of echinococcosis registered in the Republic of Uzbekistan from 1994 to 2019 shows that the incidence rate per 100,000 population fluctuates between 2.3 and 6.01 in different years and is stable (Figure 1).



Figure 1 Dynamics of echinococcosis in the Republic of Uzbekistan (1994-2019 per 100 thousand population)

In the first year of the analysis - in 1994, the incidence of echinococcosis in the country was 3.17. The highest rate for the years under analysis was observed in 2004, when it was 6.01. Since 2007, there has been a downward trend in morbidity. By 2019, the intensity was 2.3, which is a 2.5-fold decrease from 2004.

The comparative analysis of echinococcosis in the regions and cities of the Republic of Uzbekistan in 2003 and 2017 revealed the following. The highest rates were observed in Khorezm and Bukhara regions, where the incidence rate was twice as high as in the country as a whole. Relatively high morbidity rates were observed in Kashkadarya, Jizzakh, Navoi and Fergana regions. In Andijan, Tashkent region, and Tashkent, the incidence was relatively low (Figure 2).

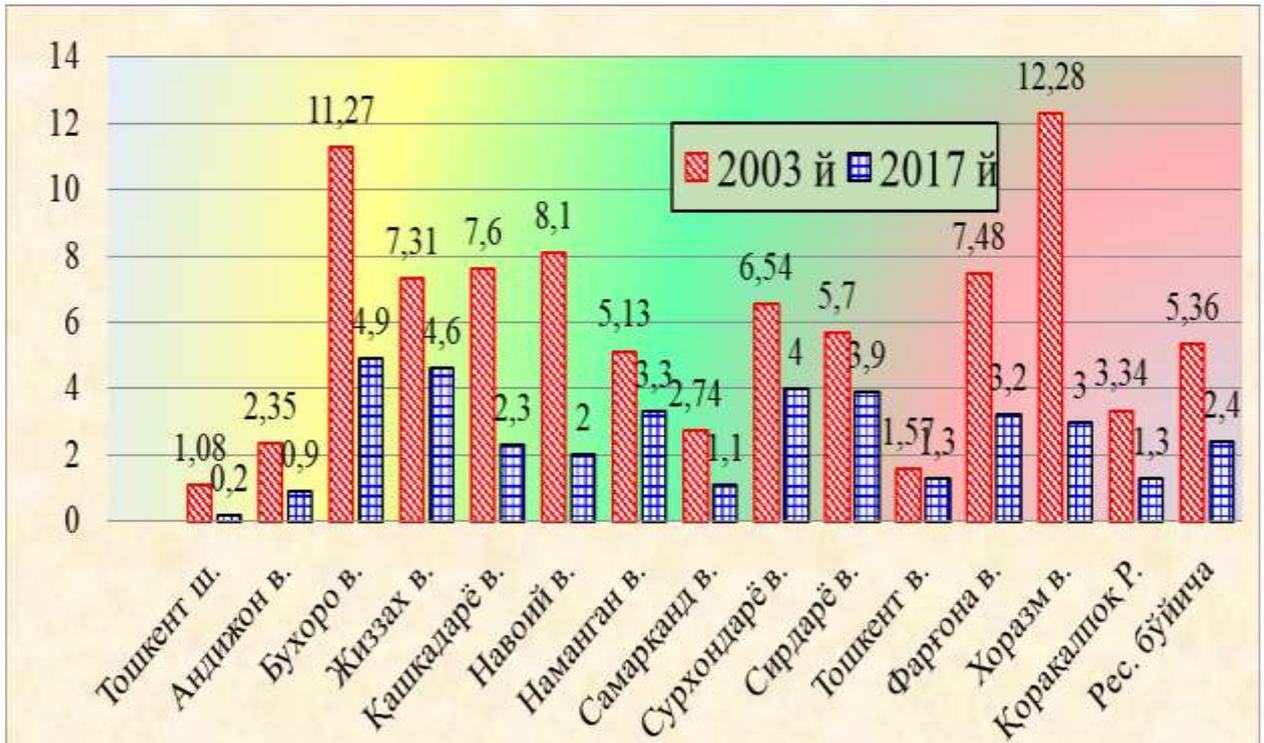


Figure 2 Prevalence of echinococcosis in the regions of the Republic in 2003 and 2017 (per 100 thousand population)

Analysis of the prevalence of echinococcosis among the population of Kashkadarya region. The results of the analysis of echinococcosis registered in Kashkadarya region from 1999 to 2018 show that the number of cases of echinococcosis in the study years ranged from 200 to 73 (Figure 3).

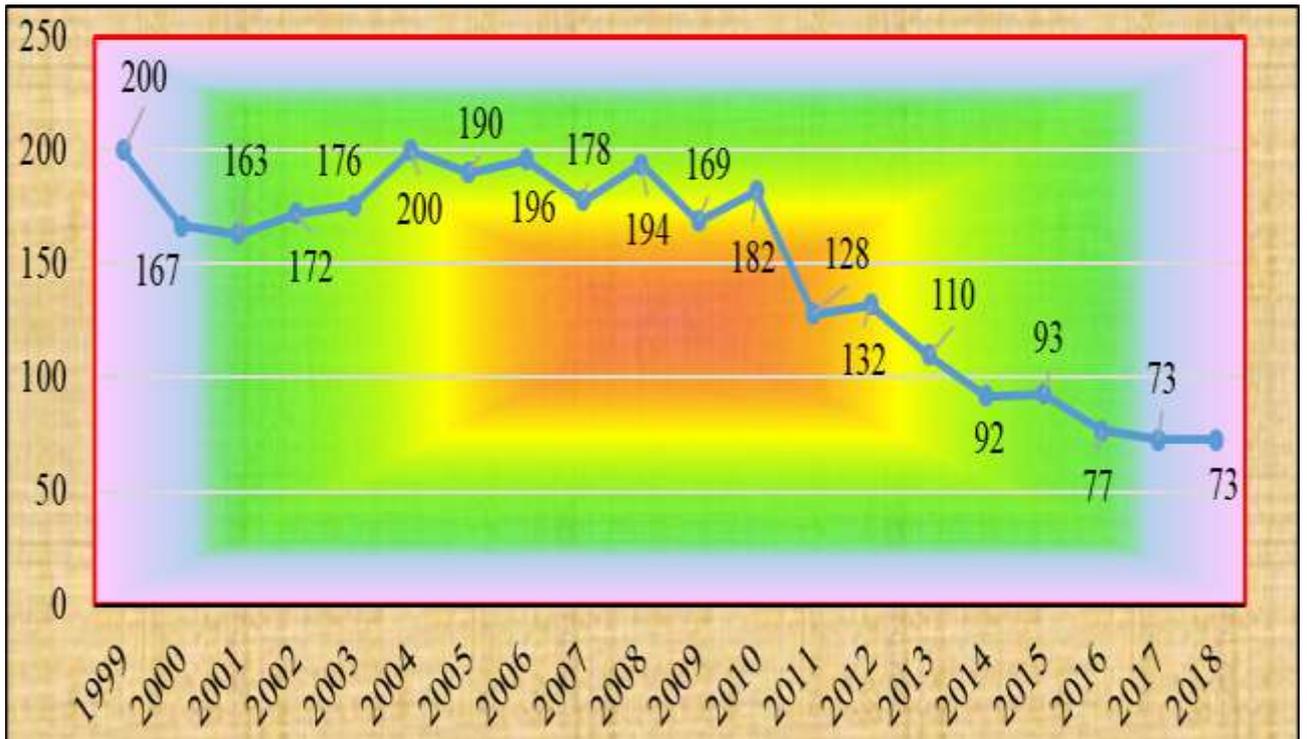


Figure 3 Registration of echinococcosis in Kashkadarya region in 1999-2018 in absolute numbers

The first year of the analysis - in 1999, 200 patients with echinococcosis were identified, and the highest rate during the analyzed years was observed in 1999-2004. Since 2009, there has been a downward trend in morbidity. By 2018, the number of patients was 73.

A retrospective analysis of the incidence of echinococcosis in rural and urban populations in Kashkadarya region in 1999-2018 was conducted. In the said years, 67.14% were found to be in rural areas and 32.86% in urban areas (Figure 4).



Figure 4. Distribution of echinococcosis among rural and urban population in Kashkadarya region 1999-2018

The results of the above analysis show that the majority of cases of echinococcosis were recorded among the rural population and were observed mainly in villages located in mountainous and foothill areas.

In order to determine the seasonality of echinococcosis, our monthly analysis of patients revealed the following Figure 5.

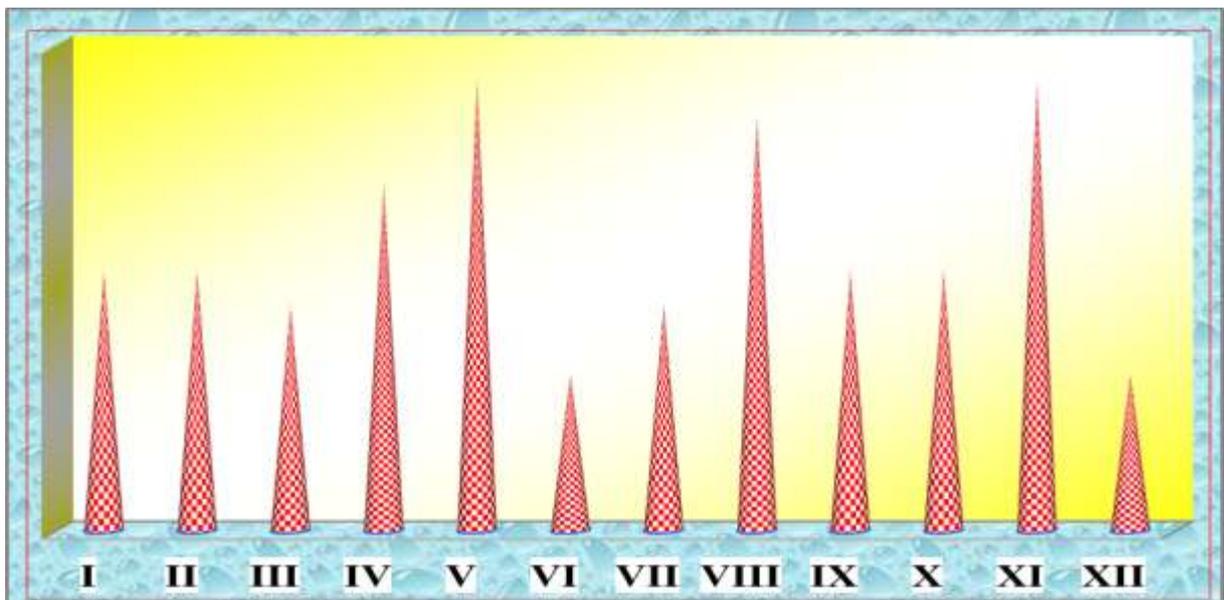


Figure 5. Monthly analysis of patients with echinococcosis in Kashkadarya region 1999-2018

In our monthly analysis of patients with echinococcosis in Kashkadarya region (Fig. 5), the incidence was higher in May, August, and November, while the remaining months were almost identical, indicating that the disease was not seasonal.

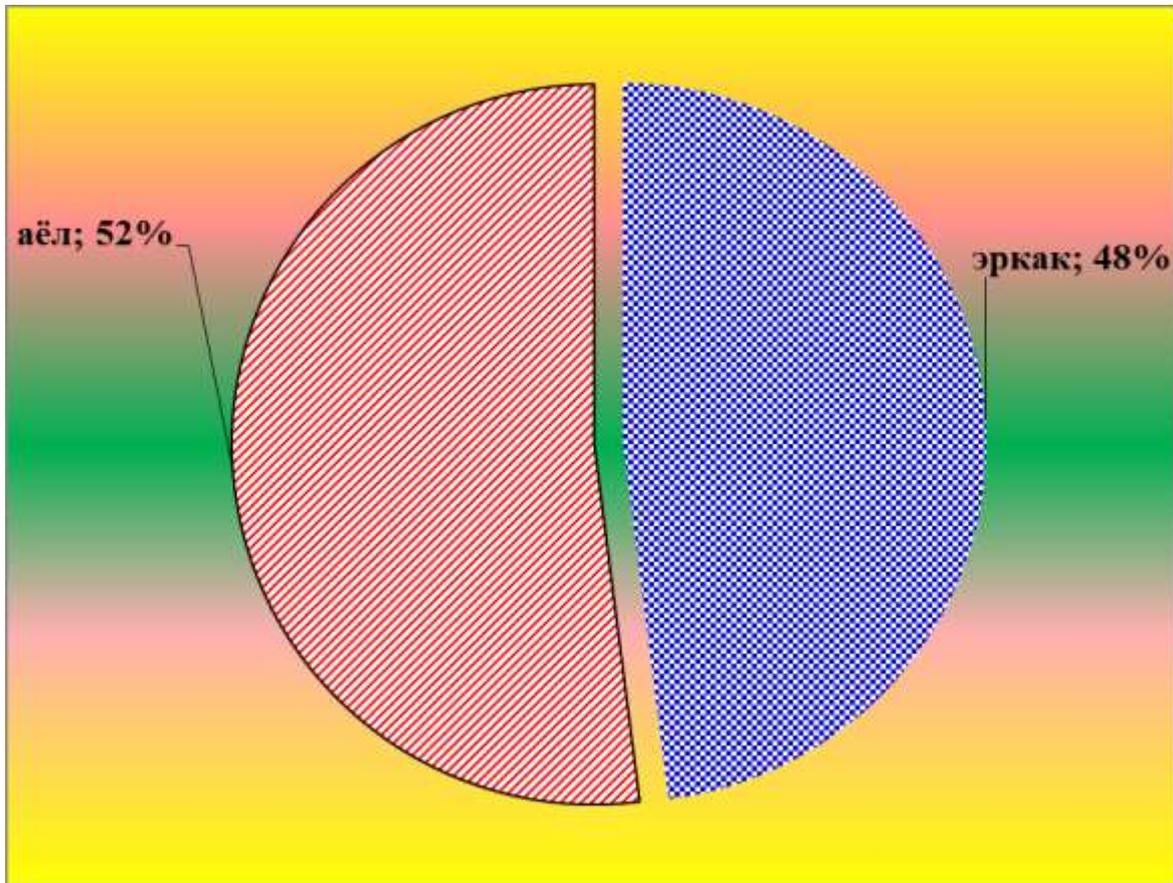


Figure 6. Prevalence of echinococcosis among people of different sexes in Kashkadarya region (%)

In the prevention of echinococcosis and the development of prophylactic measures, it is very important to determine the prevalence of the disease among different population groups.

The results of the analysis of the disease in Kashkadarya region between men and women show that (Fig. 6) in Kashkadarya region echinococcosis occurs in 48% of men and 52% of women, there is no significant difference between the sexes, almost equally distributed in different sexes. It is clear that gender has no role in the spread of the disease.

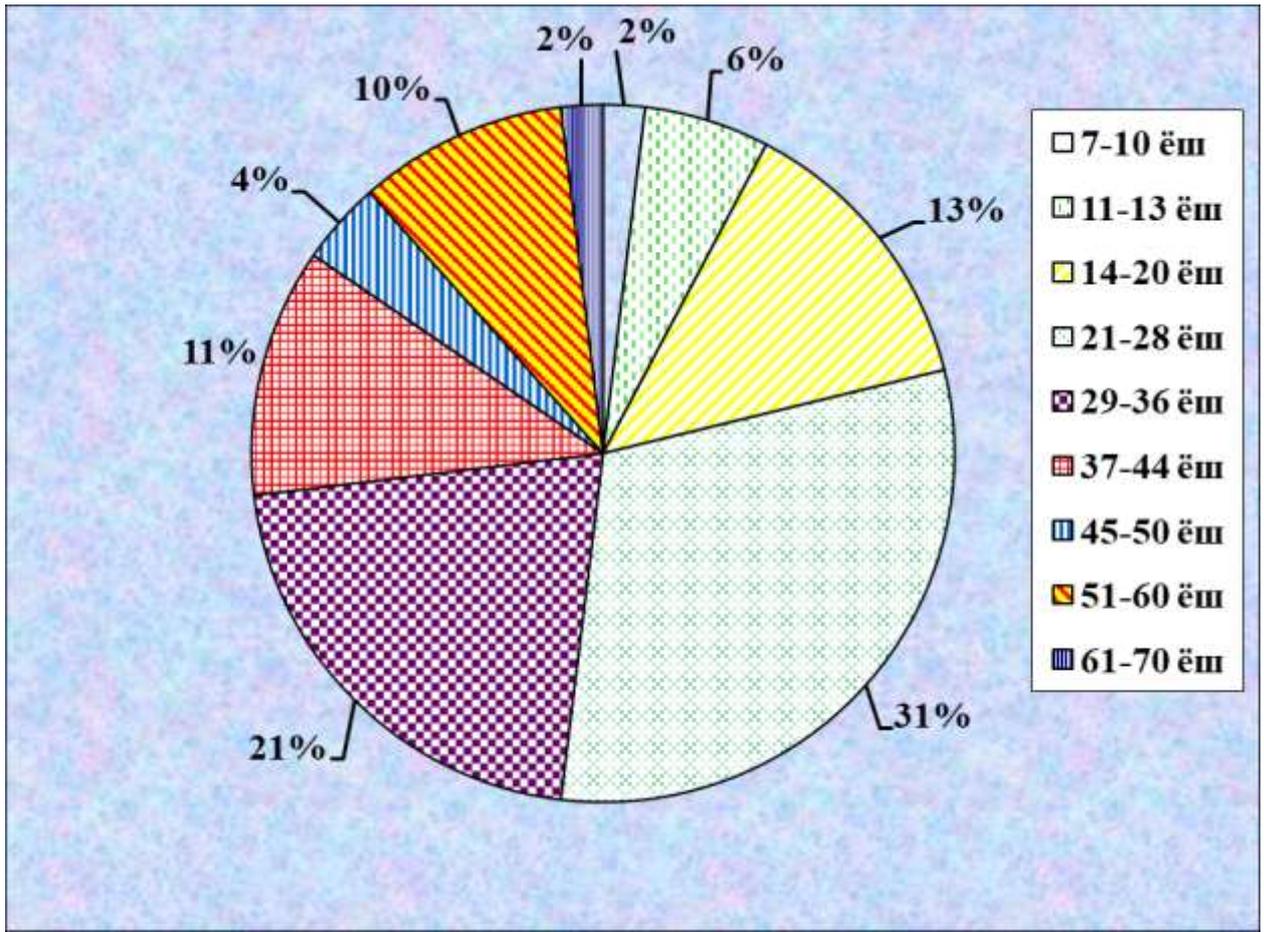


Figure 7. Distribution of echinococcosis in different age groups in Kashkadarya region (in percent)

In Kashkadarya region, the analysis of morbidity rates among young people was 14-20 years old - 13%, 21-28 years old - 31%, 29-36 years old - 21%, 37-44 years old - 11%. This means that the disease is most prevalent among the working age population of the population (Figure 7).

Results of a study of different social groups in order to increase the effectiveness of measures to prevent echinococcosis (Table 1).

Table 1

Analysis of the prevalence of echinococcosis among different social groups in Kashkadarya region

No	Social group	Absolute Number	%
1	Servants	1	1,92

2	Workers	7	13,46
3	Housewife	15	28,86
4	Student	3	5,77
5	The driver	1	1,92
6	The reader	7	13,46
7	Retired	2	3,84
8	Unemployed	16	30,77
	Overall	52	100

Examination of echinococcosis for various social groups revealed that the disease was most prevalent among housewives who did not work anywhere. In second place was identified among workers and students, and among the rest, the disease was less detected.

Table 2
Analysis of cases of echinococcosis in Kashkadarya region

№	Cases of infection	Absolute number	%
1.	From dogs	28	53,85
2.	Failure to follow the rules of personal hygiene	6	11,55
3.	From black cattle with large horns	4	7,69
4.	From the greens	8	15,38
5.	From cats	1	1,92
6.	Not specified	5	9,61
	Overall	52	100%

The analysis of cases of infection in the epidemiological survey maps of patients with echinococcosis in Kashkadarya region revealed the following (Table 2).

Of the 52 patients identified, 28 (53.85%) were infected from infected dogs, 8 (15.38%) from greens, and 6 (11.55%) from non-compliance with personal hygiene rules. From the above results, it can be seen that the role of dogs in the spread of the disease is great and it comes first, so we must also increase the level of registration of dogs and their screening for helminth carriers.

When analyzing echinococcosis patients in Kashkadarya region on the affected organs, the following was found (Table 3).

Table 3
Analysis of the affected organs of patients with echinococcosis in Kashkadarya region

№	Affected organs	Absolute number	%
1.	Liver	30	57,6
2.	Lungs	9	17,1
3.	Abdominal cavity	4	7,68
4.	Heart	1	1,92
5.	Liver + lungs + spleen	6	11,55
6.	Divorce	1	1,92
7.	Left femur	1	1,92
	Overall	52	100%

The disease was most commonly diagnosed in the liver, ie in 30 (57.6%) of the 52 patients, in the liver, in 9 (17.1%) in the lungs, and in 6 (11.55%) with the addition of liver + lung + spleen.

Prevention of echinococcosis: In order for people not to become infected with echinococcosis, measures against this disease should be taken in two directions. First of all, it is necessary to take measures to eliminate the

source of damage. To do this, it is necessary to fight the spread of echinococcal worms among cattle and dogs.

Deworming is carried out to neutralize the dogs. It should be borne in mind that shepherds can play a major role in the fight against echinococcosis in livestock areas. Therefore, it is important that they become familiar with the ways of infection with the above-mentioned diseases and measures to combat its spread. In addition to shepherds, all agricultural workers should know this.

Echinococcosis often affects people in rural areas or those who come into contact with dogs.

It should never be forgotten that echinococcal vesicles, which are secreted from slaughtered animals, are a source of infection for dogs and cats. This means that all waste generated when slaughtering and wetting cattle infected with echinococcus must be eliminated. Feeding dogs with such waste is strictly prohibited.

To avoid injury, of course, personal preventive measures should be followed. These include taking care of pets because they may have worm eggs in their fur. Hands should be washed thoroughly with soap after each pet care.

Keep in mind that children always put their hands and various objects in their mouths, which can be contaminated with worm eggs. From this it is necessary to understand how important the hygienic care of children is. Since most people are injured by hand, it is advisable not to shake hands.

It is difficult to give specific advice for every event in life, of course, but it is clear from the above that personal hygiene is important in the fight against echinococcosis.

To prevent dogs from being infected with echinococcosis, veterinary and sanitary inspections at slaughterhouses should be well established.

In the fight against echinococcosis, special attention should be paid to early detection of sick animals and their health.

The degree of infection with echinococcus and the severity of the disease require special preventive measures. These include:

- extermination of stray dogs;
- dogs should be treated and isolated at the time of embryophore separation;
- burial of dead animals;
- follow the rules of personal and general hygiene.

Mountain shepherds usually graze sheep at small to medium altitudes, where the echinococcal oncosphere is maintained for many years at a comfortable temperature and high humidity. An unfavorable epidemiological factor is that people living in mountainous areas and mountain shepherds are accustomed to using spring water, where the oncosphere falls in large quantities. Thus, mountain shepherds are at risk.

Mass medical examination of the population in endemic foci allows early detection of the disease. The level of organization of medical care in the region will be developed on the basis of data on animal damage, data from treatment and prevention facilities, as well as effective measures and improvements in the organization of medical care.

Thus, it is necessary to organize preventive measures among the population affected by echinococcosis, to organize mass medical examinations among the population in endemic areas and to carry out sanitary-educational work to prevent the occurrence of serious complications. It is necessary to organize public medical examinations among the population with highly qualified medical personnel, to install vehicles and portable diagnostic equipment.

Echinococcosis is not evenly distributed across all regions, with more registered areas in livestock.

It should be noted that the socio-economic changes of the 90s, the privatization of agriculture, the deterioration of the epizootic and

epidemiological situation with echinococcosis in the CIS countries, as well as economic difficulties, the decline of veterinary and epidemiological control over livestock on private farms. .

An important step in the system of measures for the biological protection of animals and humans is the rapid detection of zoonotic pathogens in the external environment.

At present, laboratory control is the most important component of epidemiological control in the development of appropriate organizations that allow an objective assessment of the sanitary-epidemiological situation and improve the results of its activities.

Preventive measures: As *Echinococcus granulosus* develops in two host organisms during development, the measures recommended to it are divided into two groups. 1. Measures to ensure that intermediate hosts to the first group do not infect humans and farm animals from dogs. 2. Measures to prevent damage to major hosts (dogs, wolves, foxes, chihuahuas).

1. Measures to ensure that intermediate owners do not infect humans and farm animals from dogs:

a). All dogs in the villages and auls on the farms must be registered and registered in a special book, a passport must be opened for the registered dogs, the passport must indicate the dog's age, breed, sex, color, nickname, as well as the owner's name and place of residence;

b). not to have more than 1-2 dogs in each herd, to keep a record of the farm and to provide them with food on a regular basis;

v). bringing dogs to herds, moving dogs from herd to herd should not be carried out without the supervision of veterinary staff;

g). not to keep dogs in haystacks, feed barns and barns.

d). availability and proper use of deworming sites or veterinary sanitary units in all farms and settlements;

e). Regular cleaning of the premises of registered dogs under the care of farms and the population, collection and disposal of feces;

j). handing over unregistered, unnecessary and redundant pushes to the authorized special services;

z). to carry out a wide range of explanatory work (using radio, television, newspapers, reports and interviews), to promote veterinary and sanitary knowledge of livestock breeders, population, prevention of helminthiasis, knowledge of their danger to livestock and humans;

i). dogs needed for farms and the population should be regularly dewormed.

Anesthesia in dogs is a key measure in the fight against larval cestodes, which is important in the prevention and eradication of these diseases. The following anthelmintic drugs are used to detoxify dogs.

Praziquantel (1 tablet contains 50 mg ATM) - 5 mg ATM per 1 kg live weight of dogs, cats, and other carnivores, or 1 tablet is administered orally per 10 kg live weight.

Azinox plus - 1 tablet per 10 kg live weight of dogs.

Alben S - 1 tablet per 5 kg live weight of dogs.

Ajipros plus - 1 tablet per 10 kg live weight of dogs.

Drontsit - 1 tablet per 10 kg live weight of dogs.

Tsestel - 1 tablet per 10 kg of live weight of dogs.

Kamala - 2–15 g per head dog is given.

Filiksán - 0.2-0.4 g per 1 kg of live weight of dogs.

Arecolynhydrobromide is given in the form of a 0.1% aqueous solution of 5 mg per 1 kg of live weight of dogs.

In the conditions of Uzbekistan, larval cestodes, which can develop in dogs, are prevented by deworming dogs with Arekolinidrobromide 4 times a year, ie once a quarter.

2. Measures to prevent damage to the main owners (dogs, wolves, foxes, chihuahuas).

The main hosts of echinococci - dogs and other carnivorous animals - need to do the following to prevent infection and spread of the disease.

a). slaughter of animals in poultry houses, isolation and disinfection of internal organs infected with echinococcosis;

b). the organization of a special furnace or biothermal decontamination Becker well, which burns the bodies and damaged internal organs of animals that have died uncleanly, forcibly slaughtered under farm conditions.

v). the carcasses of dead animals should be kept out of the reach of dogs until they are seen by a veterinarian.

g). to prevent the transfer of the internal organs of animals that have been forcibly slaughtered without a veterinary examination to dogs.

Epidemiological surveillance: In terms of measures against echinococcosis, epidemiological surveillance includes the following main tasks:

1. Systematic collection of information on morbidity and mortality on the basis of standardized documents;

2. Diagnostic (diagnostic) research (inspections) are often carried out on the basis of survey data from the activities of laboratory services. These services are a very important measure in determining the etiological (pathogens) factors of circulating infectious diseases in the population, as well as regular monitoring of infectious disease pathogens prevalent in the host populations.

3. Current and retrospective immunological studies to assess the risk of infection with this disease in order to determine and assess the immunological status of the population between humans and animals, by studying and collecting blood serum of humans and animals, to obtain information about the spread of infectious diseases among humans and animals make

4. Collection of data on the dynamics of the number and distribution of farm animals, which are the main host of the pathogen;

5. Summarize and analyze the data collected, make recommendations to health and veterinary organizations on current strategies and tactics to combat echinococcosis, and provide information for mutual information exchange in cooperation with the National Information Service, WHO and the International Bureau of Epizootics;

6. Carrying out research work in the field of improving the methods of epidemiological surveillance;

This section of epidemiological surveillance is important in terms of its relevance to the need to develop its methods in the future.

Of the listed elements, information on the epidemiological situation and laboratory studies are the most important.

Among the complex measures for the prevention and control of echinococcosis, it is very difficult to maintain a healthy environment in the region and farms without special tools, to rehabilitate unhealthy farms. In almost all countries, including our country, cattle are inspected in order to prevent and combat echinococcosis of cattle. Epidemiological surveillance of the epizootic outbreak is carried out, a set of measures against all stages of the epizootic and epidemic process is carried out. The intensity of the epizootic process (degree of infection of animals, activity, area of distribution, duration of the presence of an epidemic outbreak, the period of latent transmission in animals, etc.) directly affects the level of morbidity in humans. The epidemic process in echinococcosis depends on the epizootic, i.e., if the disease does not occur in animals, it does not occur in humans. In addition, the course of the epidemic process also depends on the type of circulating pathogen. It is therefore advisable to consider the specific features of the epizootic and epidemic process in different foci of echinococcosis.

Epidemiological analysis is performed at the furnace at regular intervals (months, half years, years) and retrospective epidemiological analysis should be performed. This requires the use of all elements of the epidemiological analysis: where (place, region), when (month, seasonality), in what form (epizootic outbreak, epidemic outbreak, epidemic) and who (patients, sex, age) were infected or at risk of echinococcosis.

WHO experts point out that in the implementation of structured programs for the prevention and treatment of every infectious disease, success cannot be achieved without effective implementation of epidemiological surveillance. According to VI Pokrovsky (2008), the essence of epidemiological control is the exchange of data on the system of prevention and control of infectious diseases.

According to B.L. Cherkassky (2001), epizootiological control of zoonoses is a multifaceted, dynamic study of the disease, an in-depth study of the ecology, biology and habitat of the pathogen, not only operative control of the disease. It is the theoretical and methodological basis of epidemiological surveillance, the multifactorial nature of the whole system and a functional element of the epidemic process.

Epidemiological control in echinococcosis should be carried out taking into account the pathogenetic features of the infection, the interrelationship of epizootic and epidemic conditions, the type of circulating pathogen and the social and environmental conditions that provide this or that disease between animals and humans. The results of regular epidemiological surveillance form the basis for the planning of rational, targeted measures against echinococcosis. In addition, they make it possible to detect changes in the trend of epidemic and epizootic cases.

CONCLUSIONS:

1. The incidence of echinococcosis in the Republic of Uzbekistan for 1994-2019 is 2.3-6.01 per 100 thousand population, in different years. There is a downward trend in the dynamics of this disease.

2. The disease is unevenly distributed in the regions of the Republic of Uzbekistan, the highest incidence was observed in Khorezm, Bukhara and Kashkadarya regions.

3. Seasonality is not typical for echinococcosis.

4. Echinococcosis is most prevalent in the working age population (21-40). The disease is more prevalent among those who work nowhere, housewives and students.

5. More than 50% of the disease is transmitted from dogs.

6. Mass medical examination of the population in endemic foci allows early detection of the disease.

To prevent dogs from being infected with echinococcosis, veterinary and sanitary inspections at slaughterhouses should be well established.

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