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METHODS OF STUDY FOR HELMENTOSIS OF FISH CASTING IN SOUTH UZBEKISTAN

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ABSTRACT

18-20% of the protein that humans get from animal life comes from aquatic organisms, mainly fish. Fresh fish meat contains 15-22% protein, 0.2-30.8% fat and a small amount of carbohydrates. It is also rich in amino acids and vitamin D. Adequate consumption of fish products keeps the metabolism in balance. For this reason, the increase in fish products and the development of fisheries is one of the important areas in food security.

There are diseases that directly affect fish productivity in the continuous supply of fish products through the development of fisheries. The study of the causes of emergence, reproduction, life cycle of these diseases and implementation of measures to combat them will serve to provide the population with quality fish products. Especially in the southern regions of Uzbekistan, where the climate is dry and hot and there are many natural water bodies, fish diseases are considered relevant even today.

In this article, by studying the scientific developments of foreign and domestic scientists, fish helminthiasis, its types, causes of occurrence, life cycle of helminthiasis, negative impact on fish have been theoretically studied. The diseases of carp, white amur, carp occurring in natural water bodies of Surkhandarya region and bred in fish farms have been studied by research methods, the causes of parasites and helminth infections have been established. Conclusions on fish helminth infestations have been formed and relevant proposals and recommendations have been developed.

KEYWORDS: *Fisheries, Helminths, Productivity, Cestodes, Water Bodies, Parasites, Fish Population*

INTRODUCTION

Fisheries around the world play an important role in food security. Due to the high numbers of fish, their rapid growth and the cheapness of their breeding and the daily increase in the demand for fish products, further development and improvement of the productivity of fisheries are necessary. Diseases are one of the main factors reducing the quality of fish products, breeding and maintenance in fish farms. Fish diseases are widespread in fisheries, cause great economic damage to cultural and industrial fisheries, and are a factor that negatively affects the productivity and reproduction of fish. In this connection, it is important to determine the species composition of helminths parasitizing in the body of caught fish and to develop measures to control helminth infections.

In order to manage fisheries sustainably and improve the productivity of water bodies worldwide, great attention is paid to strict parasitological control. As a result of changes in the hydrochemical and gas regime of water bodies under the influence of anthropogenic factors, as well as due to an increase in populations of intermediate hosts, parasite infestation of fish increases. Therefore, parasitological research to assess epizootological and epidemiological situation in

water bodies is considered as one of the urgent tasks.

In our republic much attention is given to supporting the fishing network, improving the efficiency of fisheries and fishing farms, the rational and efficient use of land and water resources in this area, and the widespread introduction of intensive technologies. The New Uzbekistan Development Strategy for 2022-2026 states [1] «to increase farmers' and farmers' incomes by at least 2 times through intensive agricultural development on a scientific basis, to bring the annual growth of agriculture to at least 5%». To date, although a number of scientific studies have been conducted on the identification and control of fish diseases, the diseases of fish caught in the southern regions of Uzbekistan have not been scientifically studied. Identification of fish diseases, systematic analysis of parasites, management of parasite populations in water bodies and development of countermeasures are of great theoretical and practical importance.

RESEARCH METHODS

In the research work, ichthyoparasitological, helminthological, pathological anatomical, ecological, statistical, comparative analysis, monographic observation, induction and deduction, laboratory observation and other similar methods were used.

LITERATURE REVIEW

Diseases of farmed fish have been studied by a number of foreign scientists. Their suggestions include, in particular, the following: E.A. Vitomskova studied helminths of fish caught in the Russian Far East and made an epizootological and epidemiological assessment of species dangerous to humans and animals. Diphyllobothriosis is widespread in the population of the study area and the main role of 10 species of 26 fish species, belonging to 11 families, in circulation of zoonotic helminthiasis agents has been proved. The sanitary and epizootological state of the main water bodies was assessed.[2]

A.N. Petukhov studied changes in ecology and species diversity of fish multicellular parasites of the Gorki Reservoir in Russia. It was found that the dominant species are monogenea, trematode metacercariae, representatives of leeches and crustaceans. Metacercaria posthodiplostomum brevicauda was found in this water body for the first time.[3] A. N. Petukhov and A. E. Dzhokhov studied the ecological characteristics of ligulidosis of fish in Gorki Reservoir. Attention is paid to the degree of fish infestation by ligulids, peculiarities of infestation distribution in the reservoir, age dynamics of fish infestation.[4]

M.V. Kiriushina studied parasitofauna of freshwater fish in Latvia. As a result of the research 47 parasites previously undetected have been registered in the surveyed fish. A comparative analysis of parasitofauna of fish inhabiting different water bodies has been carried out.[5]

Scientists led by A.I. Novak analysed population and species peculiarities of fish parasites distribution in the Oka reservoirs. As many molluscs were found in water bodies, Diplostomum spathaceum, Posthodiplostomum brevicaudatum, Opisthorchis felineus and other trematodes dominate in parasitofauna. The influence of environmental factors and types of fish feeding on the parasitofauna formation is analysed.[6]

E. V. Shakaralieva determined the circulation routes of fish trematodes of inland water bodies in Azerbaijan. In the course of studies, 4084 fish belonging to 58 species and subspecies were examined helminthologically. As a result of researches 81 species of trematodes belonging to 5 genera and 20 families have been revealed. Of these, 44 helminth species complete their development cycle in fish, and for 37 fish species act as second intermediate hosts.[7]

N.E. Ibragimova studied the dynamics and comparative analysis of the parasitofauna of white shale in modern environmental conditions of the Kura River basins in Azerbaijan. Data for the last 60 years have been analysed. Particular attention was paid to the species that are conditionally pathogenic to white shale and those that are pathogenic to humans.[8]

M.G. Ovchinnikov and O.V. Maslennikova studied the parasitofauna of pike in Vyatka river in Kirov region in 2016-2018. 26 specimens of quail were investigated according to the method of I. E. Bykhovskaya - Pavlovskaya and 9 species of parasites belonging to 6 classes were registered in them.[9]

A. V. Kazarnikova analysed the epizootological situation of fish in the Don deltas. 7 species of parasites belonging to protozoa, monogenia, trematodes, cestodes, crustaceans and mollusks were registered in white slates of predatory fish. Ancyrocephalus paradoxus and Achtheres percarum are mentioned as specific parasites of white slates.[10]

Scientists of our country have studied such issues as fish diseases, stages of occurrence, causes of occurrence, impact on ecofauna and fish productivity. In particular, S.B. Karimov made an inventory of fish parasites of Fergana valley. Eleven new species have been registered in the study area. The author has registered 115 species of parasites (parasitic protozoa - 32 species, monogenes - 47, flatworms - 17, ascarids - 8, echinoderms - 3, leeches - 2, crustaceans - 6) in fishes of Fergana valley water bodies.[11]

E.B. Shakarboev recorded 29 species of trematodes belonging to 5 families, 11 families and 16 genera in water bodies in Uzbekistan. Eighteen of them are known to parasitize in the adult form and 11 in the larval stage. Trematodes have been shown to be parasitic on 6 species of fish.[12]

G.B. Allamuratova analyzed fish parasites of Khorezm reservoir and ways to control them, gave scientific information on fish diseases, dominant species of parasites, intensity and degree of infestation, methods of disease treatment.[13]

P. Karayev, S. Dadaev, and H. Khakberdiyeva studied the parasitofauna of fish in the Mirzachol canal. In 152 samples of fish, 58 species of parasites were identified. In carp 23 species of parasites, in seabass - 18 species, in silver carp - 12 species, in carp - 7 species, in Turkestan goose - 5 species were identified. The parasitic diseases of fish in water bodies of Syrdarya province, fish species, helminth species are explained.[14]

F.E. Safarova studied the modern state of helminth species composition of carp fishes in water bodies of north-eastern Uzbekistan and noted that 49 helminth species belonging to 3 species, 4 classes, 15 genera, 26 families and 36 genera are parasitizing them. It is known from the literature that most of these helminths also occur in predatory fish.[15]

U.A. Shakarbaev studied the fauna and ecology of trematode cercariae in molluscs (Gastropoda: Pulmonata) of north-eastern Uzbekistan; in freshwater molluscs he identified the fauna of trematode cercariae in 2 subclasses, 10 genera, 12 families, 25 species belonging to 20 genera. In addition, the study area was investigated for 1 species for the fauna of Uzbekistan and 10 species of trematode cercariae belonging to 8 genera for the studied area.[16]

G.B. Allamuratova studied the parasitofauna of fish farms in Khorezm and identified 79 species of parasites of fish farms in Khorezm. He recorded 54 species of fish parasites in Sayod-Yap channel, 67 in fish farms, 28 in collectors and 12 species in lakes. The epizootological characteristics of fish parasitosis of Khorezm fish farms have been studied and measures for helminth infestation prevention have been developed.[17]

Scientists led by A.I.Kurbanova have studied changes in the diversity of fish parasitofauna of some water bodies in the Republic of Karakalpakstan and provided information on the species composition of parasites, the intensity of infestation and the degree of infestation. It was analyzed that as a result of lower water levels, increased salinity and degradation of the Aralboy water bodies, the distribution ranges of many parasites decreased and the number of their hosts decreased. These studies presented changes in the parasitofauna of 4 predatory fish species of the lower Amu Darya, pathogenic species with high levels of fish parasitism, pathogens, as well as the latest information on the environmental conditions of the area.[18]

A group of scientists led by Z.B. Allamuratova studied the fauna and ecology of fish parasites in the lower reaches of the Amu Darya. In the surveyed water bodies, 70 parasite species belonging to 13 groups were recorded.[19]

Analysis of scientific literature shows that researchers of the world should conduct research on species composition of fish helminths, level of fish infestation, distribution of helminths in aquatic biocenoses, prevention of infestation. However, the diversity of diseases of fish caught in the southern water bodies of Uzbekistan has not been studied. Targeted studies of fish diseases in Surkhandarya reservoirs have not been conducted at all. Therefore, in this topic, it is important to identify diseases of fish in southern water bodies of Uzbekistan, to make their species list, to study biology and ecology of dominant species, to study epizootic species and to develop recommendations on limiting their populations.

ANALYSIS AND FINDINGS

Results of fish examination by full and incomplete helminthological crushing method. The clinical examination of fish by Musselius V.A. is carried out according to the methodology developed by us started with the observation of fish behaviour in ponds or rivers. Depending on the disease manifestation in the fish and its peculiarities, the changes in the fish swimming on the water surface or falling down on the water bottom, the changes in the fish behavior, which are not natural for the fish, are important diagnostic signs for the investigation. The studies were carried out on ligulidosis-infected fish of the carp family (Syprinidae) kept in fish farms in Surkhandarya province.

Fish infected with ligulidosis were isolated and examined by full and incomplete helminthological crushing. 22 carp, 18 white amur, 17 crucian carp and 17 crucian carp were taken by their clinical signs (hanging belly, thin waist, anaemia, i.e. exsanguination) 3 of 22 crucian carp, i.e. intact, 3 of 17 carp, i.e. 17.6% were infected by ligulidosis during pathological-anatomical, full and partial helminthological examination. In Denov district, the average level of infestation was 10.5 per cent.

From Kumkurgan district, 19 specimens of carp, 15 specimens of white amur, 17 specimens of carp were caught and examined by pathological-anatomic, full and incomplete helminthological examination; totally 51 specimens of 4 variegated fish were infected with ligula. The level of infestation of fish with ligula in Kumkurgan district averaged 13.7%.

In Denov district, out of 57 fish surveyed (10.5 per cent), in Kumkurgan district, out of 51 fish surveyed (13.7 per cent), 7 were infected with ligula (Table 1).

Table 1: Prevalence of Fish Ligulosis in Denov and Kumkurgan Districts

Fish Species	Number of Inspected Fish (pcs.)		Denov District		Kumkurgan District	
	Denov District (Amount)	Kumkurgan District (Amount)	Spoiled Fish (Amount)	%	Spoiled Fish (Amount)	%
Carp	22	19	3	13,6	3	15,8
White Cupid	18	15				
Dungshon	17	17	3	17,6	4	23,5
Total	**57**	**51**	**6**	**10,5**	**7**	**13,7**

A total of 52 carp, 19 carp, 15 carp and 15 carp of three species infested with Ligula enteralis pathogens on the banks of Surkhandarya, Denov district, Surkhandarya province (Table 2) were examined during summer season by full, non-corrected helminthological survey. and pathological examination in 2 carp fish grains (11.1%) revealed 18 *Ligula enteralis* pathogens in 1 specimen on average. In 3 of 19 carp fish (15.8%) 1-2 specimens of pathogens were found, and in 3 specimens pathogen-free carp fish were found. Overall, when we observed infestation of three fish species belonging to the family *Syprinidae* with *Ligula enteralis* pathogens, the average for the summer season was 9.6%.

Table 2: Results of Surveys of Fish Infested with Ligulids in Summertime

Fish Species	Tested Fish	Spoiled Fish	Intensive Invasion	Extensive Invasion
Carp	18	2	1	11,1
Sazan	19	3	1-2	15,8
Dungshon	15			
Total	**52**	**5**	**2**	**9,6**

An average of 9.6% of infestations were observed due to the failure to take timely preventive measures in unhealthy farms. Our research also showed that the tapeworm *Digramma interrupta* parasitizes in the stomach cavity of fish of the carp family together with *Ligula intesinalis*.

As a result of the shrinking Aral Sea, fish ligulidosis is caused by the migration and dispersal of fish birds inhabiting its shores to the southern regions. This is because the main hosts of the pathogens are fishing birds.

CONCLUSIONS AND SUGGESTIONS

As a result of the above studies, although the diseases of fish occurring in natural water bodies of Surkhandarya region and those grown in fish farms are similar, the implementation of measures to prevent these diseases is different. Because the life cycle of helminths of fish living in natural water bodies is common and widespread in natural conditions. There is ample opportunity for preventive measures against parasites and diseases in fish farms.

Diseases occurring in fish are studied in this sequence, such as identifying diagnostic signs by observing unusual changes in the natural behavior of fish, catching fish with suspected infestation, determining the status of infestation of fish ligulidosis by complete and incomplete helminthiasis. At the same time, each fish species has its own peculiarities. According to the results of our observations, ligulidosis was not observed in white amur raised in fish farms of Surkhandarya region and in white amur caught in open water bodies.

It has been observed that diseases of pond-raised carp and grass carp are higher than those of carp and grass carp in natural ponds. Diseases of carp are widespread in natural ponds. The reason for this depends on the part of the water where these fish live and what they feed on. The shallowness and variability of the water flow in natural ponds and the

constant volume of water in fish farms also influence fish diseases.

From our point of view, it is necessary to carry out preventive measures against helminth infections of fish caught in the southern regions of Uzbekistan and pay attention to the following aspects:

Prevention of nesting of fish-eating birds near fishing farms and migration of fish-eating bird colonies into lakes and reservoirs of fishery importance;

If ligulidosis-infected fish are found in the fishery, reduce the volume of water and catch all fish and transfer them to another water body, drying and treating the bottom of the water body where the disease was found;

Chemical treatment in the ponds where the fish are infested with ligulidosis.

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