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INFECTION OF BOTHRIOCEPHALUS OPSARIICHTHYDIS (YAMAGUTI, 1934) IN FISH FROM SURKHANDARYA REGION'S WATER BODIES

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ABSTRACT
This paper delves into the study of fish infections caused by the cestode species Bothriocephalus opsariichthydis (Yamaguti, 1934) in the water bodies of the Surkhandarya region. The research discusses the cestode's impact on the fish, its life cycle, and pathogenic attributes. A significant finding of this study is the seasonal prevalence of infection, with a spike in the summer season. This heightened infection rate is intricately tied to temperature variations. The article also provides guidance on preventive strategies against botryocephalosis.

KEYWORDS: *Cestode, primary host, intermediate host, parasite, cyclops, coracidium, procercoid, invasion intensity, invasion breadth.*

INTRODUCTION

As the global population burgeons, so does the demand for agricultural commodities, with a significant focus on fish and related products. Fish stand out as a prime source of nutrition, enriched with vitamins and minerals, and their assimilation by the human body is efficient. Their nutritional potency is eclipsed only by staples like milk and eggs.

In response to this demand, the agricultural sphere, with an emphasis on fisheries, has witnessed sweeping reforms. Holistic programs, encompassing the augmentation of fish capture in our nation, introduction of novel species, and elevation of production volumes through advanced methodologies, have been conceptualized and implemented. Moreover, strategies for the judicious use of both natural and artificial water reservoirs and the advancement of intensive fish farming are in place.

However, challenges persist. Among the primary constraints impeding the surge of fish stocks, the enhancement of coveted fish species, and the acclimation of new breeds is the affliction of fish with pests and a myriad of diseases, notably the parasitic ones. Such parasitic maladies, often leading to catastrophic fish mortalities, can inflict significant economic setbacks to fisheries.

The significance of understanding fish biology cannot be overstated, especially when charting a course to combat parasitic infestations effectively. The detrimental effects of parasitic helminths on fish are multi-pronged, causing tissue and organ damage, degrading the quality of fish-derived products, and impinging on their reproductive capabilities. Furthermore, certain helminths, once transferred to humans, can trigger severe ailments including diphyllobotriosis, dioctophimosis, and opisthorchosis. Human consumption of inadequately cooked or raw fish can pave the way for these parasites to mature within the intestinal tract, with some even infiltrating the liver, leading to extensive tissue and organ damage.

RESEARCH METHODS AND MATERIALS

Our investigation focused on the cestodes found in fish harvested from diverse water bodies in the Surkhandarya region. The study encompassed 520 fish samples across 8 species, procured from both natural aquatic habitats and pond farms [5]. Helminthological analysis, both complete and partial, underpinned the parasitological assessment of these specimens [8].

For the preservation of the extracted cestodes, we employed 70% ethyl alcohol and 4% formalin solution. The ensuing species classification of the cestodes was facilitated through referenced literature [4].

RESULTS AND THEIR ANALYSIS

In our research, we focused on the study of botryocephalosis caused by cestodes in game fish collected from different types of water bodies in Surkhandarya region. Also, in the Surkhandarya region, we obtained the following information on the distribution of these diseases among hunted fish during a thorough helminthological examination to study botryocephalosis infection. :

The main causative agent of the disease belongs to the Bothriocephalidae family *Bothriocephalus opsariichthydi s*(Yamaguti, 1934) is a cestode. The body size of this cestode varies widely. In mature cestodes, the length is from 18 mm to 280 mm, and the width is from 1.5 to 4 mm. The color of adult cestodes is white, yellowish, and the body is in the form of a long strip. The head is

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called the scolex and is much wider than the body. The body (strobila) consists of numerous segments (proglottids), each of which contains a set of reproductive organs.

*B. opsariichthydis*intermediate host is cyclops (copiopod crustaceans), main host is fish. The life cycle takes place in two hosts.

Adult cestodes accumulate in the intestines of fish, lay eggs, and the eggs are released into the environment with waste. In 2-6 days, the larvae of koracidium emerge from the eggs that fall into the water.

Representatives of the Cyclops, Mesocyclops, Acanthocyclops genera swallow the larva of the coracidium swimming in the water. The next invasive larva of B. opsariichthydis develops in the cyclops organism in 3-8 days [1].

*Bothriocephalus opsariichthydis*development of cestodes directly depends on water temperature. Egg incubation takes 3-4 days at 16-19oC, 1.5-2 days at 25-30oC. Development of the parasite in a cyclops organism takes 10-12 days at 16-19oC, and 4 days at 25-30oC [7].

Fish become infected with cestodes when they eat infected cyclops while feeding on zooplankton. Bothriocephalus opsariichthydis transforms into an adult cestode in 17-20 days in the fish organism [6].

Cestodes parasitize the intestines of fish, the accumulation of parasites in the intestinal cavity leads to blockage of the digestive tract. This expands the intestinal wall and sometimes leads to perforation. The intestines can become inflamed, leading to bleeding and necrosis. Clinical signs include weight loss, anemia, and death (especially in young fish) [3]. In the detection of infectious diseases, the presence of eggs or body parts in the feces indicates the presence of cestodes in the intestines of fish [2, 9].

During our research, 520 fish belonging to 8 species were pierced. In comparison to the spring season, the damage rate is 1.5 times higher in the summer and autumn seasons.

Table 1
Seasonal infection of fish with the cestode Bothriocephalus opsariichthydis

No	Fish species examined	Number	Season of the year		
			Spring	summer	Autumn
			IE%, Copy II	IE%, Copy II	IE%, Copy II
1	Carp - Cyprinus carpio (Linnaeus, 1758)	95	6.31 1-2	13.6 1-3	8.42 1-2
2	White humpback fish - Hypophthalmichthys molitrix Valenciennes, 1844)	83	3.61 1-2	8.43 1-3	4.81 1-2
3	White carp - Ctenopharyngodon idella (Vallenciennes, 1844)	89	3.37 1-2	8.98 1-3	5.61 1-2
4	Silver heel fish - Carassius auratus gibelio (Bloch, 1782)	76	2.63 1-2	5.26 1-4	6.57 1-2
5	Common red eye fish - Rutilus rutilus (Linnaeus)	65	4.61 1-2	10.76 1-3	4.61 1-2
6	Cypress humpback fish - Hypophthalmichthys nobilis (Richardson, 1846)	64	3.12 1-2	9.37 1-2	6.25 1-2
7	Black fish - Schizothorax intermedius (McSlelland, 1842)	30	- -	10.0 1-2	3.33 1-2
8	Silurus glanis (Linnaeus, 1758)	18	- -	11.111-2	5.55 1.2
	Total:	**520**			

The figures in the table show that the invasion extent of botryocephalosis varies from 6.31% to 2.63% in spring, from 13.6% to 5.26% in summer, and from 8.42% to 3.33% in autumn, depending on the type of fish.

We found that the intensity of infestation was 1-2 copies per fish affected by botryocephalosis in the spring season, 1-4 copies in the summer season and 1-2 copies in the autumn season, respectively.

Thus, in our research conducted in different types of water bodies in Surkhandarya region*Bothriocephalus opsariichthydis*shows that the intensity and extent of invasion of infected fish is much higher in the summer season compared to other seasons of the year.

CONCLUSION

Based on the results of this research, the following conclusion can be reached. In fishinfection with botryocephalosis can be observed in the spring, summer and autumn seasons of the year. Damage levels in water bodies were recorded. The highest seasonal

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damage indicators corresponded to the summer season. It was found that the degree of contamination in pond farms from different types of water bodies is relatively high.

It was found that the main source of the spread of botryocephalosis is infected adult fish and infected cyclops. All the collected data were studied and analyzed, and the following measures and suggestions were developed.

In order to combat the disease, complex veterinary-sanitary and treatment measures should be carried out in the fisheries where indicators of damage have been recorded. Deworming of infected fish Disinfection methods should be implemented in pond farms to destroy helminth eggs. It is advisable to use drugs such as kamala, phenothiazine, felixan, fenasal as an anthelmintic agent [1]. As a therapeutic feed, 1% phenosal should be given by the generally accepted method

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