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HEMATOLOGICAL PARAMETERS OF PARASITOLOGICAL EXAMINATION OF FISH

ГЕМАТОЛОГІЧНІ ПОКАЗНИКИ ПАРАЗИТОЛОГІЧНОГО ДОСЛІДЖЕННЯ РИБИ

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Abstract. *The data of hematological parameters of carp for phylometroidosis are given. During the parasitological examination on the body of the fish revealed swelling, bumps, reddened areas, stiffness of the scales. Pink helminths 7-9 cm long were found in some scaly pockets and muscle tissue. Mature nematodes were more often localized under the scales around the head in the spine, on the sides and abdomen, sometimes on the gill covers, less often they were found on the tail. The obtained data indicate significant changes in hematological parameters of the erythroid blood line of sick and healthy fish. Analysis of the data showed that the number of erythrocytes was significantly higher in clinically healthy fish, but the resistance of erythrocytes was slightly increased in the blood of fish with phylometroidosis. The hematocrit was slightly higher in the blood of clinically healthy fish. There was a slight decrease in the number of T-active lymphocytes in the blood of fish affected by phyllometroidosis by 15.76% (P <0.01). The same downward trend was found for other indicators, namely T-total lymphocytes by 12.84% (P < 0.01). The indicators of T-helpers (by 17.70%), T-suppressors (by 35.31%) and the values of B-RUL of lymphocytes by 10.55% (P < 0.05) probably decreased.*

Keywords*. fish, phylometroidosis, blood, invasion, reservoir, diagnosis, erythrocytes, leukocytes*

Introduction.

A significant danger for fish farming is the defeat of fish by parasitic diseases, and for humans - the consumption of fish infected with helminthiasis. Fish, which is a valuable food product, can cause serious human helminthiasis. Parasitic diseases are accompanied by metabolic disorders in the body of fish, resulting in reduced productivity and payment for food. Therefore, timely diagnosis of fish diseases and their prevention and eradication are important in economic terms and are of great importance [4,7].

The importance of ichthyopathological and ichthyoparasitological research is growing due to the expansion of fisheries and the introduction of new breeding facilities (including those imported from other countries), the use of new veterinary

ichthyoparasitological methods. The losses caused by fish diseases, especially parasitic ones, remain significant. It is clear that the exact diagnosis of invasive disease can be made only by identifying its causative agent to the species, and without such a diagnosis can not be effective prevention and treatment, ie reducing losses in fish farming [5].

Observation of changes in blood composition helps to control the physiological state of the fish body, which is extremely important when conducting various ichthyological, ichthyopathological and other studies and fish farming activities [3,4].

Fish blood clearly responds to the influence of various pathogenic factors: pathogens of infectious and invasive diseases, toxicants, adverse environmental conditions and more. Changes in hematological parameters of the blood can be judged on the nature of pathological processes occurring in the body of fish. The results of hematological and biochemical and cytogenetic studies of blood are ancillary and allow to clarify the diagnosis of the disease. The main hematological indicators used in ichthyopathology are: determination of the number of erythrocytes and leukocytes, hemoglobin level, erythrocyte sedimentation rate and leukogram excretion [5].

The aim of the study was to study fish - biological, hematological and biochemical parameters of sick and clinically healthy fish.

Material and methods. Two groups of fish were used for research. Clinical signs of phylometroidosis were observed in one group of fish caught from the pond. Sick and clinically healthy fish were kept in separate ponds. To determine changes in the parasitofauna of pond fish depending on the habitat, step-by-step parasitological dissections and fish data, planting density, fish feeding, and pond fertilization were taken into account.

Results of the research.

The fish lost weight, lethargy, gill anemia, the fish stayed closer to the surface of the water, did not take food. During the parasitological examination on the body of the fish found swelling, bumps, reddened areas, stiffness of the scales. Pink helminths, 7-9 cm long, were found in some scaly pockets and muscle tissue. Adult nematodes were more often localized under the scales around the head in the spine, on the sides and abdomen, sometimes on the gill covers, less often they were found on the tail. At the opening of the fish there was an inflammatory process in the liver, it is enlarged, clay-colored, the pulp is softened with foci of hemorrhage. The kidneys are blood-filled, slightly enlarged. The swimming bladder is inflamed, its walls are matte with a dirty gray tinge. On the basis of epizootological data, clinical signs and pathological - anatomical changes, we diagnosed phylometroidosis of fish.

The study of changes in the erythroid blood count was performed in sick and healthy fish. The results of studies have shown that hematological parameters in carp undergo significant changes in the occurrence of diseases. As can be seen from the data shown in table 1, the number of erythrocytes in the blood of sick fish is much smaller compared to their number in the blood of healthy ($P < 0,01$).

The resistance of erythrocytes in the blood of clinically healthy carp is 41.1% lower ($P < 0.05$) compared to the resistance of erythrocytes in the blood of sick fish. The obtained research results also indicate significant changes in hematocrit in the

blood of sick and healthy fish. There was a probable decrease in hematocrit in sick fish by 20.6% (P <0.05) compared with clinically healthy.

Table 1

Indicators of the erythroid series of fish blood (M±m, n=8)

Indicators	Fish sick	Fish clinically healthy
The number of erythrocytes T / l	1,1±0,07	2,1±0,23**
Erythrocyte resistance	1,4±0,28	0,8±0,15*
Hematocrit,%	35,0±2,72	41,5±2,30*
Hemoglobin, g%	6,75±0,50	10,8±0,70***
Erythrocyte volume 1 μg	168,8±13,54	133,42±22,63
The amount of hemoglobin in 1 erythrocyte is 10-12 g	54,8±1,89	51,0±6,55
The concentration of hemoglobin in 1 erythrocyte, %	25,42±2,55	30,94±2,24

*Degree of probability: * - P<0,05; ** - P<0,01; *** - P<0,001*

Studies of hemoglobin content in carp blood have shown that its content has also undergone significant changes in sick and clinically healthy fish. In particular, in the blood of clinically healthy fish the hemoglobin content was 10.8 ± 0.70 g /%, in the blood of sick fish it was lower by 31.6% (P <0.001). The content of hemoglobin in the blood of carp is directly dependent on the number of erythrocytes. When the disease occurs, the number of erythrocytes and the content of hemoglobin in the blood of carp decreases. The volume of one erythrocyte in the blood of clinically healthy fish was 133.42 ± 22.63, and in the blood of sick fish this figure increased by 18.7%. The amount of hemoglobin in one erythrocyte is almost the same in the blood of sick and healthy fish. It was 54.8 ± 1.89 and 51 ± 6.55′10-12 g, respectively. The concentration of hemoglobin in one erythrocyte increased slightly in clinically healthy fish.

Thus, the obtained data indicate significant changes in hematological parameters of the erythroid blood of sick and healthy fish. Analysis of the data showed that the number of erythrocytes was significantly higher in clinically healthy fish, but erythrocyte resistance was slightly increased in the blood of fish with inflammation of the swim bladder. The hematocrit was slightly higher in the blood of clinically healthy fish. The amount of hemoglobin was significantly higher in the blood of clinically healthy fish, which can be explained by the high oxygen content in the water. The volume of one erythrocyte was significantly higher in diseased fish. There is a slight decrease in the number of fish and the concentration of hemoglobin in one erythrocyte.

Based on the results obtained, it can be concluded that the occurrence of the disease significantly affects the hematological parameters of carp, which should be taken into account when diagnosing this disease. The test for micronuclei in recent years has gained widespread recognition in the study of applied mutagenesis, mainly due to the relatively simple preparation of drugs and their rapid analysis. Analysis of drugs from different series showed that the micronuclei in the erythrocytes of

peripheral blood of fish grown on the farm are found with different frequencies in sick and healthy fish. In clinically healthy biennials, the number of micronuclei in erythrocytes was 8.2 ± 0.51%. An increase in micronuclei was observed in sick fish by 35.4%, respectively (P <0.001). Thus, micronuclei are found in the erythrocytes of the blood of sick and healthy fish. However, in sick fish their number is much higher.

Of particular note is the analysis of the ratio of T lymphocytes to B cells and T helpers to T suppressors. In recent years, a number of studies in veterinary medicine have shown that information about the protective properties of the organism, its adaptation to specific conditions increases significantly, if, among other indicators in the blood to take into account the number of individual populations and subpopulations of lymphocytes, especially T- and B- cells. Experiments have shown that these cellular elements are central to the immune system. In particular, T-helpers are involved in recognizing the alienation of genetic information and promote the differentiation and proliferation of B-lymphocytes - the main producers of antibodies. T-suppressors, in contrast, inhibit immune responses and thus play a regulatory role in the body's defenses. Under normal conditions, there is a certain ratio of T-helpers to T-suppressors. With a decrease in the number of T-helpers, which is observed in humans and animals with immunodeficiency, the number of T-suppressors increases and the body's protective functions against infections decrease sharply. Therefore, to determine the body's ability to fight infection, it is important to control the normal parameters of these cells in the blood.

When studying the effect of phylometroidosis on the body of carp in experimental ponds, evaluated changes in T- and B-cell immunity of clinically healthy and infected fish. Changes in immunity were determined by the following indicators: T-active lymphocytes (TA), T-total lymphocytes (TE), T-helpers (Th), T-suppressors (Ts), B-lymphocytes. Analysis of the data shows a slight decrease in the number of T-active lymphocytes in the blood of the experimental group of fish by 15.76% (P < 0.01). The same downward trend was found for other indicators, namely T-total lymphocytes by 12.84% (P < 0.01). Significantly decreased indicators of T-helpers (by 17.70%), T-suppressors (by 35.31%) and the value of B-RUL of lymphocytes by 10.55% (P < 0.05).

Conclusion.

Based on the results obtained, it can be concluded that the occurrence of the disease significantly affects the hematological parameters of carp, which should be taken into account when diagnosing this disease. The test for micronuclei in recent years has gained widespread recognition in the study of applied mutagenesis, mainly due to the relatively simple preparation of drugs and their rapid analysis.

References

1. Beliba VG Parasitofauna of fish of natural and artificial reservoirs of the Kharkiv region // Veterinary medicine.- 2006. - № 86.- P. 30 - 39.

2. Vovk NI, Maistruk IA, Sidorenko MM, Maltsev VI Ichthyopathological situation in Shatsk lakes. // Scientific and practical conference with international participation: "Current issues of health of fish and other aquatic organisms" (Feodosia, May 26 - 29, 2008) .- Veterinary medicine. Interdepartmental thematic

scientific collection. - Kharkiv, 2008. - P.93 - 96.

3. Davydov ON, Temnikhanov Yu.D., Kurovskaya L.Ya. Control of parasites and diseases of aquatic animals: world experience (review of FAO and OIE recommendations). Preprint. - K .: Institute of Zoology. I.I. Schmalhausen National Academy of Sciences of Ukraine, 2006. - 38 p.

4. Temnikhanov YD, Neborachek MI Influence of ectoparasites on morpho-physiological properties of silver crucian cells // Veterinary Medicine. Interdepartmental thematic scientific collection. - Kharkiv, 2008. - P. 434 - 438.

5. T.M. Prilipko NV Bukalova, NM Rich. Safety indicators of fresh-ripened commercial carp. Abstracts of the state scientific-practical conference "Ichthyology and morphology of fish - scientific and practical basis of aquaculture", dedicated to the 85th anniversary of the Department of Ichthyology and Zoology and the 60th anniversary of the professor, doctor of biological sciences. BNAU-2017.- P.72-756.

6. T.M Prylipko, V.B Kostash Productive and biochemical indicators of carp when grown in ponds of the Podilsky Tovtry National Nature Park. Scientific Bulletin of the Lviv National University of Veterinary Medicine and Biotechnology named after SS Gzhytsky Volume 15, Issue 3-3- 2013.- P. 182-185.

7. Prylìpko, T.M., Prylìpko, l.V. Task and priorities of public policy of Ukraine in food safety industries and international normative legal bases of food safety // Proceedings of the International Academic Congress «European Research Area: Status, Problems and Prospects» (Latvian Republic, Rīga, 01–02 September 2016).

Анотація. *Наведені дані гематологічних показників риби за філометроїдозу. При проведенні паразитологічного дослідження на тілі риби виявляли припухлості, горбики, почервонілі ділянки, наїжачення луски. У деяких лускових кишеньках та мязевій тканині було виявлено гельмінтів рожевого кольору, довжиною 7-9 см. Статевозрілі нематоди частіше локалізувалися під лусочками навколо голови у хребтовій частині, на боках і черевці, інколи на зябрових кришках, рідше їх знаходили на хвостовій частині. Одержані дані свідчать про значні зміни гематологічних показників еритроїдного ряду крові хворих та здорових риб. Аналіз даних показав, що кількість еритроцитів була значно вища у клінічно здорових риб, проте резистентність еритроцитів була дещо підвищена у крові риб, хворих філометроїдозом. Гематокритна величина була дещо вищою у крові клінічно здорових риб. Встановлено незначне зниження кількості Т-активних лімфоцитів у крові риб уражених філометроїдозом на 15,76 % (P < 0,01). Таку ж тенденцію до зниження встановлено стосовно інших показників, а саме Т-загальних лімфоцитів на 12,84 % (P < 0,01). Вірогідно знижувалися показники Т-хелперів (на 17,70 %), Т-супресорів (на 35,31 %) та значення В-РУЛ лімфоцитів на 10,55 % (P <0,05).*

Ключові слова*. риба, філометроїдоз, кров, інвазії, водойма, діагноз, еритроцити, лейкоцити*