Spectrum Journal of Innovation, Reforms and Development
Volume 14, April, 2023 | ISSN (E): 2751-1731
Website: www.sjird.journalspark.org

MORPHOLOGICAL AND BIOCHEMICAL INDICATORS OF THE BLOOD OF FISH INFECTED WITH HELMINTHS

Kuvvatov Khusniddin Abdukhakimovich
Doctoral Student of the Samarkand State University of Veterinary Medicine, Livestock and Biotechnologies. Uzbekistan, Samarkand
xkuvvatov90@gmail.com

Daminov Asadullo Suvonovich
Professor of Samarkand State University of Veterinary Medicine, Livestock and Biotechnologies. Uzbekistan, Samarkand
a.daminov1960@mail.ru

ABSTRACT
The development of the fishing industry is aimed at meeting the needs of the world's population in food products, the production of fish products that meet the requirements of environmentally friendly international standards, the analysis of literature data on morphological and biochemical changes in the body of infected fish with various infectious and non-infectious diseases, especially helminthiasis, serves to increase the quality of research conducted in this area. This article is dedicated to this area.

Keywords: Morphophysiological, physiological, biochemical, hematological, Romanovsky- Giemsa, lymphocytes, neutrophils.

Introduction

P-83 dated January 13, 2022 of the President of the Republic of Uzbekistan “On additional measures for the further development of the fishing network”, in its decisions and in other regulatory legal documents related to this activity, defines important tasks aimed at developing the fish industry and providing the population with environmentally clean fish products. Based on the above decision, more attention is paid to the development of the fishing industry in our republic. To do this, first of all, it is necessary to introduce fish species well adapted to the conditions of our republic, as well as to carry out timely detection, treatment and prevention of various diseases that occur in fish.

But, despite this, the question of the number of cyprinids infected with cestodes, as a result of which the morphological and biochemical parameters of the blood change, as well as the conduct of many scientific studies, the implementation and development of important recommendations, remains relevant.

Purpose of the Study

Analysis of data from the scientific literature of our republic, CIS countries and foreign scientists on changes in the morphological and biochemical parameters of the blood of cyprinids infected with cestodes.

Literary Analysis

It is known that fish oil has very high nutritional properties and is important for the physiological processes of the human body. Fish products are rich in minerals, vitamins, and essential amino acids, including lysine, and are widely used in the daily diet, as well as in dietary and baby food [18].

For this, various types of fish are used, including those caught from the sea, rivers and natural reservoirs, as well as artificially grown fish in specialized pond farms. According to the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), over the past three decades, consumption of fish and seafood increased 2,8 times in 1985 and doubled in the next 15 years. The growth rate of fish consumption by the world population in recent years has increased from 9,4 to 13,3% per year [10].

Morphophysiological status is a set of morphological and hematological indicators that objectively reflect the physiological state of fish and can be effectively used to solve theoretical and practical issues of fishery science. Aquaculture problems require further development of the theory and practice of using morphophysiological indicators [1; 8; 17].

The morphological study of blood elements began at the end of the 19th century, after Romanovsky (1891) developed a method for differentiated staining of preparations with a mixture of methylene dyes. Morphological studies carried out in the twentieth century on fish blood products stained according to Romanovsky (Khaidar G., 1967; Pestova I. M., 1957; Ostroumova I. N., 1958; Chistova M. N., 1967; Ivanova N. T. ., 1970; Kalashnikova Z. M., 1976; Ellis A. E.) 15 1976; 1977, Fange R., 1968 etc.). The morphology of peripheral blood cells in fish is much more diverse than in mammals. The variety of cellular elements in the blood of fish is combined into three large groups of hematopoiesis: erythrocytes - "erythrocytes", leukocytes - "leukocytes" and "platelets - platelets" [7].

Fish lymphocytes stained according to Romanovsky-Giemsa are small cells, often round, amoeboid in shape, with a large, red-purple nucleus and a narrow, barely noticeable layer of sharply basophilic cytoplasm. Functionally, lymphocytes are divided into two classes: cells that constantly carry antigen receptors on their membrane and are capable of direct intercellular communication, as well as cells that release soluble forms of antigen receptors and deliver these receptors throughout the body. These two classes are called T- and β-lymphocytes, respectively. Fish lymphocytes perform an adaptive immune function [19; 26].

Neutrophils predominate among fish granulocytes. Morphologically, fish neutrophils are cells with a colorless or seromatous cytoplasm. The dense red-violet core is rounded, serrated or sharply incised [2; 6].

Their main function is, firstly, to release substances that attract other cells to the area of inflammation, and secondly, to promote the destruction of bacteria [27].

In addition, neutrophils exhibit weak phagocytic activity in the focus of inflammation [29].

Neutrophils have a large amount of antibiotic proteins in their granules [23].

Neutrophils play an important role in the antibacterial and antifungal defense of the body [16]. Therefore, an increase in neutrophils cannot have a significant effect on the elimination of helminths from the body, probably due to inflammatory reactions, the ingestion of the products of the metabolism of Ligulidae into the host organism, and damage to fish tissues due to the growth of Ligulidae. In this case, neutrophils perform the functions of phagocytosis. Prevents the development of processes leading to the death of the host organism [28].

In addition to the activation of a nonspecific immune response in the form of neutrophilia, immunosuppressive phenomena are observed in the body of fish infested with L. interrupta. Firstly, the intensity of proliferation of burst forms of leukocytes decreases and, accordingly, the renewal of all forms of leukocytes in the body of fish decreases. Secondly, it should be noted that in young forms, the number of pseudobasophils in the head of the kidney (myelocytes and metamyelocytes) and the number of pseudoeosinophils in the kidney stem are sharply reduced, and due to young forms of metamyelocytes, the renewal of these forms of granulocytes almost completely stops. It is known that in case of helminthiases, eosinophils are attracted to the site of invasion due to the release of specific products by T-lymphocytes and basophils, such as the anaphylactic factor of eosinophil chemotaxis. Degranulation of eosinophils occurs in the presence of specific antibodies; the fusion of intracellular granules with the cytoplasmic membrane and the release of their contents into the extracellular environment. The degranulation reaction is one of the mechanisms by which eosinophils use the toxic content of their granules to destroy large targets that are not susceptible to phagocytosis. Based on our data and the above data, invasion of Ligulidae suppresses the proliferation of blast forms of leukocytes and leads to a decrease in the number of young forms of acidophilic and basophilic granulocytes, which play an important role in anthelmintic immunity [20; 30; 31].

Based on our data and the above data, invasion in liguliasis provides an increase in blast forms of leukocytes and leads to a decrease in the number of young forms of acidophilic and basophilic granulocytes, which play an important role in immunity. Studies in the head of the kidney also reveal the activation of proliferative processes of lymphocytes, the redistribution of the ratio of young and mature forms towards an increase in the number of young lymphocytes. In the kidneys of adult fish, only β-lymphocytes are formed [24; 25].

Pathological changes in the morphology of fish erythrocytes occur during poisoning and diseases. These include: deformation of the cytoplasm of cells, anisocytosis (difference in size), poikilocytosis (difference in shape), polychromasia (difference in hemoglobin content), formation of erythroplastids (binding part of the cytoplasm), hemolysis of erythrocytes (violation of the integrity of the cell membrane), changes in the structure of the nucleus and color of chromatin, discoloration of nuclear chromatin, karyorrhexis (nucleus division into several small dense fragments), nuclear fission, expulsion with the movement of the nucleus to the edge of the cell [3; 11].

One of the important indicators of intensive fish farming is the study of the physiological, morpho-biochemical properties of blood, which is considered a kind of mirror and reflects metabolic processes in the body. The morphobiochemical composition of blood varies

depending on the habitat and lifestyle of different fish species, and even in fish of the same species, morphobiochemical blood parameters depend on their age, sex, nutrition, living conditions and season. Even a short-term change in nutritional status causes a change in blood composition. Morphological analysis of blood has found wide application in scientific research in the field of fisheries [15; 32; 33].

This makes it possible to fully control the feeding processes of breeding and juvenile fish, diagnose diseases and take measures against them when keeping fish in natural and artificial conditions.

Many authors emphasize the importance of studying the blood of fish caught in the oceans and seas [4; 5; 12].

The same authors used hematological indicators in fish acclimatization, assessment of the physiological state, feeding with artificial feed, diagnosing diseases, and also in studying fish taxonomy to assess the reaction of fish adaptation to natural and climatic conditions [14].

Hematological indicators are of great theoretical and practical importance in the physiological state of fish in normal and pathological conditions, as well as in water pollution with pesticides and industrial waste [19; 21; 22].

Much attention is paid to the possibilities of hematological research methods in determining the pathology of fish and the factors influencing them. Hematological analysis provides excellent operational information to further improve the results of traditional methods of control in fisheries [13; 34].

Conclusions

According to the analyzed literature for various diseases, there is not enough data on the morphological and biochemical parameters of the blood of cyprinids. There is very little information on the morphological and biochemical indicators of deposition, especially in fish infected with helminthiases.

References

1. Головина Н.А. Гематология прудовых рыб. / Головина Н. А. Тромбицкий И.Д. - Кишинев: Штиинца, 1989. - 156 с.

2. Головина Н.А. Морфофункциональная характеристика крови рыб - объектов аквакультуры: автореф. дис. ... д-ра биол. наук: 03.00.10 / Нина Александровна Головина. – М., 1996. – 53 с

3. Житенева, Л. Д. Гематологические показатели сельди Clupea pallasi Val. в зависимости от ее физиологического состояния / Л. Д. Житенева, М. М. Гориславская // Вопросы ихтиологии. - 1986а. Т. 26, №1. - 137-146.

4. Иванова Н.Т. Материалы морфологии крови рыб. Автореф. дис. д.б.н. Н.Т.Иванова Свердловск., 1972. – 24 с.

5. Иванова Н.Т. Материалы морфологии крови рыб. Ростов-на-Дону. – 1970. – 136 с

6. Иванова Н.Т. Система крови (материалы к сравнительной морфологии системы крови человека и животных / Н.Т.Иванова. – Ростов-на-Дону: РГПИ, –1995. – 156 с.

7. Калашникова З.М. Исследование морфологического состава крови рыб /. Калашникова З.М // Исследования размножения и развития рыб (метод, пособие). - М., 1981. - С. 110-123.
8. Коржуев П.А. Количество крови и гемоглобина в организме каспийской миноги / Коржуев П.А., Глазова Т.Н. // Обмен веществ и биохимия рыб. - М. Наука, 1967. - С. 178-182.
9. Ляхнович Л.П. Влияние условий выращивания на гематологические показатели белого амура, обыкновенного толстолобика и карпа. Беларусь. Институт рыбного хозяйства. – 1969. Т6. – С. 52-57
10. Маловастый К.С. Диагностика болезней и ветсанэкспертиза рыбы [Текст]/ Маловастый К.С. – СПб.: Изд-во «Лань», 2013. – 512 с.: ил. – 1000 экз. – ISBN 978-5-8114-1354-6.
11. Метелев В.В., Канаев А.И., Дзахозова Д.Г. - Водная токсикология. - М.: Колос, 1971. - 247с
12. Мовчан В.А. Изучение физиологии прудового карпа. Тр. совещания по физиологии рыб. – М.: АН СССР - 1958. – С. 251-254
13. Попов О.П. Гематологические индикаторы интенсивности пластического обмена карпа и сазана / О.П. Попов // Экологическая физиология рыб: Тез докл. IIIВ сес. конф. Ч. 1.- Киев: Наукова думка, 1976 – С. 105-106.
14. Смирнова Л.И. Состояние крови рыб и оценка природной среды. Биологические методы оценки природной среды. – М.: Наука. – 1978.– С.244-257
15. Тарасенко С.Н., Мельников Г.Б. Морфологическая структура форменных элементов крови леща, сазана и судака. Современные вопросы экологической физиологии рыб. М. Наука, 1979. – С. 239-246.
16. Тотолян А.А. Клетки иммунной системы. Т.1; Т.2. / Тотолян А.А., Фрейдлин И.С. – СПб.: Наука. – 2000. – 231 с.
17. Шварц С.С., Смирнов В.С., Добринский Л.Н. Метод морфофизиологических индикаторов в экологии наземных позвоночных / Шварц С.С., Смирнов В.С., Добринский Л.Н. // Тр. ин-та экологии растений и животных. - Свердловск, 1968. — Вып. 58. - 387 с.
18. Шепелев А.В., Кожухова О.И. Товароведение и экспертиза рыбы и рыбных товаров [Текст]/– Ростов-на-Дону: «Март», 2001. – 154 с.
19. Шоҳимардонов Д.Р. —Минтақаларда балиқчиликни ривожлантириш тавсиянома, Тошкент-2010. – 79 бет.
20. Alvarez-Pellitero P. Fish immunity and parasite infections: from innate immunity to immunoprophylactic prospects / Alvarez-Pellitero P. // Vet. Immunol. Immunop. 2008. –V. 126. – P. 171–98.
21. Blaxhall P.C., Fish J. The hematological assessment of the health of freshwater fish. A review of selected literature. Biol. – 1972. – V.4. №4. – P. 593- 604.
22. Hicky C.R. Fish hematology, its uses and significance. New York fish and game journal 1976. V.23. №2. – P.170-175.

23. Roitt I. Immunology. / Roitt I., Brostoff J., Male D.L. – London: Mosby Wolfe, 2000. – 592 p.
24. Romano N. Distribution of leukocyte subpopulations in developing carp (Cyprinus carpio): immunocytochemichal studiyes / N. Romano, J.J. Taverne-Thiyele, J.C. Maanen [yet al.] // Fish Shellfish Immun. -1997. - V. 7. - R. 439–453.
25. Rombout J.H.W.M. Characterisation of a T cyell lineage marker in carp *Cyprinus carpio* L. / Rombout J.H.W.M., J.W. Van de Wal, A. Companjen // Dev. Comp. Immunol. – 1997. - V. 21. – P. 35–46.
26. Scapigliati G. Functional aspects of fish lymphocytes / Scapigliati G. // Dev. Comp. Immunol. – 2013. V. 41. V. 200–208.
27. Verburg-van Kemenade L.B.M. Characterization of macrophages and neutrophilic granulocytes from thye pronephros of carp (Cyprinus carpio) / Verburgvan Kemenade L.B.M., Groyeneveld A., Van Rens B.T.T.M. [yet al.] // J. Exp. Biol. – 1994. –V. 187. – P. 143-158.).
28. Whyte S.K. Thye innate immune response in finfish: a reviyew of current knowledge / Whyte S.K. // Fish Shellfish Immunol. – 2007. – V. 23. – P. 1127–1151.
29. Yellis A.Ye. Thye leukocytes of fish: A reviyew / A.Ye. Ellis // J. Fish Biol. – 1977. – V. 11. – P. 453
30. Abdukhakimovich X.K., Suvonovich D.A. morphological indicators of blood in carp fish infected with ligulides //Journal of Integrated education and Research. – 2023. – T. 2. – №. 1. – S. 93-97.
31. X.A. Kuvvatov., A.S. Daminov. Karpsimon baliqlarning asosiy sestodozlari, ularni baliqlar organizmining morfo-fiziologik xususiyatlari // Veterinariya meditsinasi. – 2022. – T. – №. 7. – S. 19-21.
32. Эшимов Д., Кувватов Х.А., Исломов Х.И., Рахмонов Ф.Х., Шоумурадов М. Сравнительная активностъ кокцидиостатиков при эймериозе кур // Экономика и социум. 2021. №5-2 (84).
33. Kh. I. Islomov., D. Eshimov., F. Kh. Rakhmonov., H. A. Kuvvatov., M. Shomurodov. Study of the influence of medicinal preparations used in experimental eimeriosis of chickens on morphological indications of blood // Academic research in educational sciences. 2021. №5.
34. A.X. Xamraev., X.A. Kuvvatov. Baliqlar gushtining kimyoviy tarkibi, oziqaviy qiymati va ahamiyati // Chorvachilik va nasilchilik ishi. – 2022. – T. – №. 5. – S. 34-37.