

ABSTRACT

the dissertation work of Kalkayeva Dinara Baktovna on the topic «Pathomorphological and histochemical changes of avian aspergillosis», submitted for the degree of Doctor of Philosophy (PhD) speciality 6D120100 - Veterinary medicine

Relevance of the research topic. In the Republic of Kazakhstan, poultry is one of the livestock sectors that is developing rapidly in a short period of time and provides food security. In our country, a large percentage of poultry meat production comes from large poultry farms and farms, and 25 per cent of this production is provided by urban and rural home producers. Unfortunately, dense arrangement of birds and non-observance of zoohygienic requirements in many cases lead to the emergence and spread of infectious diseases. Aspergillosis, the causative agent of which is a microscopic fungus, is particularly dangerous in poultry farming. Aspergillosis is common throughout the world, including Kazakhstan. Aspergillosis affects not only domestic birds, but also captive wild birds. This disease is dangerous not only for animals and birds, but also for people. In poultry farming, aspergillosis is very dangerous and causes great losses. 90 per cent of sick birds can die. Clinical diagnosis of aspergillosis is difficult. Because the same symptoms occur in other diseases. Making an accurate diagnosis at the beginning of the disease is very important. In such cases, pathological, pathohistological and histochemical investigations are carried out in addition to laboratory tests. Many studies have investigated the etiology, epidemiological status, precautions and control measures of the disease. But pathological anatomy, pathological histology and diagnosis are not specified in scientific literatures. And also in the literature it is not possible to find studies about aspergillosis of golden eagles and saker falcons kept in domestic conditions.

Therefore, we can say that at present the study of avian aspergillosis is more relevant than ever.

The purpose of the dissertation research - The main objective of the research work, pathological and some histochemical changes and in aspergillosis in domestic and wild birds.

Research objectives:

1. To investigate some pathological and histochemical changes in organs of chickens of different ages killed by acute aspergillosis;
2. To investigate some pathological, histological and histochemical changes in organs of poult turkey from acute aspergillosis;
3. To investigate some pathological, histological and histochemical changes in organs of geese fallen from acute aspergillosis;
4. To investigate some pathological, histological and histochemical changes in organs of saker falcons fallen from acute aspergillosis;
5. To investigate some pathological, histological and histochemical changes of organs of the golden eagle fallen from chronic aspergillosis.

Materials and methods of research. As the objects of the thesis research 102 corpses of birds fallen from aspergillosis in natural conditions were autopsied. Including: chickens-58, turkeys-8, geese-20, falcon balobon-12, golden eagle-4. Organs of fallen birds were examined by two methods: macroscopic and histological. To detect changes in organs and tissues we used haematoxylin-eosin, and to detect fungi in them we used Schiff reagent.

According to the results of our study, chicks aged 1 week to 2 months had acute aspergillosis and adults had chronic aspergillosis. That is, sensitivity to aspergillosis was higher in young birds than in adults.

The disease was recorded in all seasons, but especially in autumn and winter. If the disease was acute, it was detected: breathing worsened, whistles in the respiratory tract, nasal discharge, sneezing, ruffled feathers, decreased appetite, anaemia of the mucous membranes of the eyes and mouth, and increased body temperature.

In the chronic course of the disease, the following was observed: worsening of respiration, whistling in the respiratory tract, anaemia of comb, diarrhoea, ruffled feathers, decreased appetite, general weakness, anaemia of ocular and oral mucous membranes, atrophy of skeletal muscles, swelling and redness of nasal mucous membranes.

In avian aspergillosis, the main pathological and anatomical changes are described by the appearance of various voluminous granules in serous membranes in the peritoneum and pleura, in the air sacs and in the lungs. Depending on the severity of the disease course their macroscopic character is seen differently.

In the course of acute aspergillosis in chickens, turkeys and goslings revealed pathological and anatomical changes in the section of sternum and peritoneum with the size of millet white-grey granules, the diameters of which reach 1-3 mm, their consistence is hard, located in different places.

And in balobon falcons as compared to other birds aspergillosis granules were large in size. When autopsy was performed their shell was of connective tissue, the centre was like a mass of cottage cheese. We did not find information about pathological morphology in scientific literature.

Among birds, aspergillosis has been found in adult chickens and golden eagles raised willy-nilly in zoos. Externally describing fallen domestic birds from chronic aspergillosis we see that their consistency is slightly below average, feathers are ruffled, natural brightness is faded, darkened. Externally visible mucous membranes of the eyes and mouth are white-grey. On dissection, major changes were seen in the lungs and air sacs. The damaged lungs were enlarged, edges rounded, consistency very dense, on the surface of the lungs white-yellow, thick formations, which are not easy to remove with hands, they are located densely in the lung parenchyma. We did not find information about aspergillosis lesions in chickens in research works.

We saw that in adult chickens, along with the air sacs, the lungs were also changed. In all cases, all parts of the air sacs were damaged, their walls were thickened, on the surfaces of the air sacs there were yellow masses of different sizes, there were flat structures like buttons.

When examining golden eagles killed by aspergillosis, their fatness was below average, skeletal muscles atrophied, feathers ruffled, and colour darkened. The mucous membranes of the mouth and nose were pale grey, and aspergillosis granulomas were found in the lungs, air sacs, liver, chest and peritoneal serous membranes, and at the tracheal bifurcation. In many cases, granulomatous masses merge with each other and form conglomerates.

We have not met information in publications of near and far countries about pathomorphological changes in chronic and generalising aspergillosis of golden eagles. Our data are a new addition to the study of aspergillosis.

In the small intestine, aspergillosis granulomas are seen in the intestinal saline, they are white-yellow, the size of millets, round, consistence hard, located in different places. In the circles of the granuloma small vessels are hyperemic. The mucous membrane of the organ is slightly oedematous, reddened and covered with clear fluid. In the walls of the intestine green, liquid masses are found.

Histological changes. In histological studies of organs and tissues of birds fallen naturally from aspergillosis we find sharp pathological changes in respiratory, digestive and mucous membranes.

Some researchers (O.K. Khmel'nitsky, 1972; Kaminsky Y.M., Timoshenko V.S., Polushin O.G., Kolesnikov V.I., 2007; Solovyova D.A., 2014) believe that if we can not show the identified fungi from fallen or living organisms, we can not say that it was the cause of the disease. If the cause of the disease was a fungus, it sits in certain tissues and tissue reaction appears in the organs. Therefore, when examining mycoses, the first thing is to identify the causative agent, and the second is to detect histological changes.

In our studies of changes in tissues and organs from aspergillosis we used histological and histochemical methods.

For general histological changes in tissues we used haematoxylin-eosin, and for detection of fungi located in organs and tissues we used Schiff reagent.

According to the results of our research that in the acute course of aspergillosis in chickens of different birds in lungs, air sacs, in costal pleura we found similar granulomas in structure. All granulomas in the centres are necrotising and divided, and branched filaments of fungi were found there. Foci of necrosis are covered with histiocytes, pseudoeosinophilic leukocytes and lymphoid cells. The mucous membranes of bronchi and parabronchi are oedematous and variously developed mucous membranes are dystrophied. In some areas of the bronchi, desquamations are seen in the epithelial cells. These results of our study confirm the data indicated in scientific research works (Dankovich R.S., Kolyada I.C., 2017).

It was found that during the course of chronic aspergillosis in adult chickens and golden eagles, the areas around the granulation tissue consisting of histiocytes fibroblasts and giant cells were not developed foci of necrosis.

In chickens of birds that were ill with acute aspergillosis was found in the interstitial tissue of cardiac muscle vessels filled with blood, interstitial tissue

swollen, some cardiomyocytes nodular dystrophies and foci of liffoid cells and histiocytes.

The macroscopic picture in aspergillosis is similar to many avian disease etiologies. In this regard, we will have to distinguish aspergillosis at the pathological and anatomical level from tuberculosis, pullorosis, coligranulomatosis, and avian histomonosis.

In distinguishing aspergillosis from other diseases, we must first distinguish from tuberculosis. Many domestic and wild birds are susceptible to tuberculosis. On the affected areas of tuberculosis appear yellow-grey tubercles of varying size. This disease most often affects adults. In diseased birds, tuberculae can be found in the liver, spleen, small and large intestines, and rarely in the meat and glandular parts of the stomach. In the chronic course of the disease, tuberculae may form in the lungs. The histological structure of tuberculi is characterised by necrosis and granulation tissue formed around it. In many cases, foci of necrosis show multinucleated large cells.

The macroscopic pictures of aspergillosis and pullorosis are similar. Under natural conditions, chickens and turkeys are affected by pullorosis. Adults are rarely affected. At autopsy, if the disease was acute liver increases, consistency becomes soft, grey-peat colour. And in subacute and chronic course white-grey necrotic areas appear in liver, in spleen, in myocardium, in lungs.

Coligranulomatosis affects all partridges. In this disease, as in aspergillosis, granulomas appear in the affected organs. But white-grey granulomas occur in the liver and appendix. Their size is about the size of a pea or a chicken egg. When these granulomas are cut, a curd-like white mass or a squamous mass is seen. This granuloma is caused by the appearance of fibrinous exudate in one place. In the areas around the necrosis, lymphoid and epithelioid cells form in rexis and pycnosis.

Birds with histomoniasis have necrotic granulomas in the liver and blind intestines. The liver increases in size, fills with blood, and grey millet-sized areas form under the capsule. The blind intestine increases in size, and when you cut into it, you can see that the intestinal walls are thickened.

Thus, our studies help to diagnose and distinguish pathological and morphological changes in early aspergillosis from other diseases.

Novelty of the research paper. The scientific literature on pathomorphology of aspergillosis in birds is completed with such data:

- For the first time pathological and anatomical changes in aspergillosis victims of aspergillosis in natural conditions of burkut and falcon balobols were characterised on the basis of histological and histochemical methods;
- In domestic and wild birds fallen in natural conditions from aspergillosis, pathomorphological changes depended on the age of the birds and the duration of the disease.
- In natural conditions in golden eagles diseased with chronic aspergillosis, the disease proceeds in a generalised form.

- The specificity of aspergillosis from other bird diseases was determined by pathological, histological and histochemical methods.

Theoretical and practical importance of the research work.

Based on the results of the study of aspergillosis of domestic and wild birds, their pathological anatomy and pathological histology were studied in depth. Dissertation information was used for training veterinarians in scientific and pedagogical processes. In particular, lessons on epidemiology, pathological anatomy, autopsy were supplemented with new information on aspergillosis.

Along with this, a new method of diagnosis of avian aspergillosis was introduced. Taken results of the study from pathomorphology and side effects can be used by other authors.

The main problems promoted for defence:

- Peculiarities of pathomorphological (macroscopic and microscopic) changes in cadavers of chickens of different ages diseased with aspergillosis

- Features of pathomorphological (macroscopic and microscopic) changes in turkeys diseased with aspergillosis;

- Peculiarities of pathomorphological (macroscopic and microscopic) changes in falcons with aspergillosis;

- Features of pathomorphological (macroscopic and microscopic) changes in geese;

- Peculiarities of pathomorphological (macroscopic and microscopic) changes in golden eagles.

The studies were conducted according to the plan within the framework of the research work topic: "Pathomorphological and histochemical changes in avian aspergillosis" 2019-2021. State registration № 0119RKI0320, 16.10.2019.

Research paper articles.

Eight papers were published on the thesis work, including:

- Registered in the international database Scopus and Web of Science (Frontiers in Veterinary Science. 10:1141456. Doi: 103389/fvets.2223.1141456 - Switzerland. April, 2023. CiteScore 3.3, percentile 82) - 1 article

- Copyright certificate -1 (№ 6440, 14.10.2019);

- Patent in useful model (№5299 2019/0976.2);

- According to the results of the research in the journals of RK At the request of the control committee in the sphere of Education and Science - 3 (2022-2023);

- In the scientific collection of LLP "KazNIVI" - 1 (2019);

- International journal "Bilim zhane Gylym". Astana (2020) - 1 scientific article.

Scope and structure of the thesis. The thesis is set out on 112 pages of computer text and consists of an introduction, literature review, materials and methods of research, results of own research, generalisation and evaluation of research results, conclusion, list of used sources, appendices. The thesis is illustrated with 8 tables, 41 figures. The list of literature includes 134 titles.