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THE EFFECT OF AMPROLIUM ON SOME BLOOD INDICATORS

OF DOMESTIC GESE (ANSER ANSER DOMESTICUS) DURING ASSOCIATIVE INVASIONS

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შინაური ბატების (ANSER ANSER DOMESTICUS) სისხლის ზოგიერთ ინდიკატორზე ამპროლიუმის გავლენა ასოციაციური ინვაზიების დროს

¹აზერბაიჯანის რესპუბლიკის მეცნიერებისა და განათლების სამინისტროს ზოოლოგიის ინსტიტუტი, ბაქო, აზერბაიჯანი; ²თბილისის სახელმწიფო სამედიცინო უნივერსიტეტის სოციალური და კლინიკური ფარმაციის დეპარტამენტი, საქართველო

რეზიუმე

სტატიაში მოცემულია კვლევა კოკციდიოსტატიკური პრეპარატის, ამპროლიუმის მოქმედება, ბატების ასოციაციური ინვაზიის დროს (კოკციდია + ჰელმინთები) ჯანმრთელი, ავადმყოფი და ნამკურნალები ფრინველების სისხლის ზოგიერთ ბიოქიმიურ და მორფოლოგიურ პარამეტრებზე. 10-20 დღის ბატების სისხლში (*Anser anser Domesticus*) დათვლილი იყო ერითროციტების, ლეიკოციტების, ჰემოგლობინის კონცენტრაციის, ლეიკოციტების ფორმულა და განისაზღვრა ალანინ ამინოტრანსფერაზასა და ასპარტატამინოტრანსფერაზას აქტივობა. გამოვლინდა, რომ ჯანსაღი ბატების სისხლში მთლიანი ცილის, ალბუმინისა და გლობულინის რაოდენობა იზრდება ფრინველის ასაკის მიხედვით, ხოლო ასოციაციური ინვაზიის შემთხვევაში ასაკთან ერთად მცირდება მთლიანი ცილის, ალბუმინისა და გლობულინის რაოდენობა. სისხლში ინდიკატორების რაოდენობა არ უბრუნდება ნორმას ინვაზიის შემდგომ პერიოდში. ასევე გამოვლინდა, რომ ALT და AST აქტივობა მცირდება ფრინველების ინფიცირებისას და არ უბრუნდება ნორმალურ მდგომარეობას დაავადების დასრულების შემდეგაც კი. ბატების ასოციაციური ინფექციის შემთხვევაში პრეპარატი ამპროლიუმი აღადგენს ფრინველის სისხლის მორფოლოგიურ და ბიოქიმიურ პარამეტრებს.

Coccidiosis is an infectious disease of the intestinal tract of wild and domestic animals caused by different protozoan parasites of the genus *Eimeria*. These include *Isospora*, *Neospora*, *Cryptosporidium*, and *Eimeria* of the phylum Apicomplexa. These parasites are widespread, especially where extensive production systems are used to raise livestock. The disease causes severe symptoms such as diarrhea, dehydration, and death in young animals [1]. Parasites are transmitted from one host to another through feces, which release invasive oocysts into the environment.

It is of real interest to study the protozoan parasites of birds, especially *Eimeria*, *Cryptosporidium*, and *Isospora*, and identify effective measures against them. Helminthiasis and coccidiosis are widespread among poultry and are a factor that significantly inhibits the development of poultry farming, and thus causes damage to the economy [2].

Geese and ducks are unpretentious to food, omnivores, and in places located near water bodies, they feed on aquatic invertebrates. Every year, a large number of different chemical drugs are proposed for use in the treatment and prevention of coccidiosis, which makes it difficult to select the most promising ones without thorough research. In this regard, the selection of new effective drugs and the preparation of a regimen for their use remain relevant. It is important to use drugs that have a good effect on metabolism, stimulate the protective functions of the bird's body, and at the same time do not harm the quality of poultry products [3-7].

Amprolium has been used for many years to control coccidiosis. The drug is mainly used to treat animals with clinical signs of the disease. It is available as an oral solution, soluble powder or granules feed supplement.

The study of the influence of widely used anti-coccidial drugs on the physiological state of birds is relevant and has a certain theoretical and practical significance.

Determination of enzyme activity is of great importance in the study of the pathogenesis of the disease and developing measures for the treatment and prevention of the disease. It is known that complex biochemical processes are carried out in the tissues of the host and parasite with the participation of enzymes. Parasitic diseases, including coccidiosis, cause changes in enzyme activity in the host body [8]. Based on the activity of the enzyme, one can draw a conclusion about the general condition of the body and the pathological processes occurring in the body before and after treatment.

Aim of the work: The purpose of the work is to study the effect of the coccidiostatic drug - amprolium in associative infestation of geese (coccidia + helminths) on some biochemical and morphological parameters of the blood before and after treatment.

Methods of investigation. Experiments were conducted on 10-20-day goose (*Anser anser domesticus*). The number of erythrocytes, leukocytes, concentration of hemoglobin, and the leukocyte formula were determined by the methods used in hematology [9]. During the period of disease and treatment, the total protein was determined by the Lowry [10] method, the activity of aminotransferase-alanine transferase (ALT-EC.2.6.1.2.) and aspartaminotransferase (AST-EC.2.6.1.1.) method was determined by Reitman, Frenkel [11]. Statistical processing of the results was carried out with the help of IBM SPSS Statistics v.20. The statistical validity of the differences between the groups was verified using the t-criterion of the Student.

Table. Dynamics of morphological and biochemical parameters of geese blood, (M±Sd, n=5)

Indicators	parameters of healthy geese blood				parameters of geese blood in associative infestation				parameters of treated geese blood in associative infestation			
	Age of birds (days)				Age of birds (days)				Age of birds (days)			
	10	13	15	20	10	13	15	20	10	13	15	20
Total protein, g/l	32,9 ±0,02	34,3 ±0,02	36,5 ±0,02	40,3 ±0,13	32,5 ±0,03**	26,0 ±0,63*	27,0 ±0,27*	29,1 ±0,32**	33,3 ±0,02	35,7 ±0,03*	37,1 ±0,15*	40,7 ±0,15
Albumin, g/l	12,4 ±0,20	12,9 ±0,11	12,5 ±0,21	17,8 ±0,02	9,5 ±0,02*	8,4 ±0,06*	8,6 ±0,16*	9,4 ±0,08	12,0 ±0,17*	12,4 ±0,21*	12,0 ±0,13*	17,5 ±0,14
Globulin, g/l	20,2 ±0,15	21,4 ±0,05	21,9 ±0,11	22,5 ±0,05	14,8 ±0,06*	17,8 ±0,14*	18,0 ±0,06	19,0 ±0,12*	19,8 ±0,04*	20,4 ±0,11*	20,6 ±0,04	22,2 ±0,14
Red blood cells, 10 ¹² /l	2,08 ±0,02	2,11 ±0,15	2,15 ±0,01	2,18 ±0,08	2,06 ±0,01	2,12 ±0,01**	2,09 ±0,04	2,14 ±0,07	2,00 ±0,01	2,02 ±0,02*	2,14 ±0,03	2,16 ±0,04
Leukocytes, 10 ⁹ /l	33,75 ±0,22	29,63 ±0,23	29,61 ±0,04	33,44 ±0,03	34,27 ±0,03**	29,82 ±0,03	30,45 ±0,01**	33,40 ±0,04	33,71 ±0,02	29,65 ±0,04	29,60 ±0,03	33,40 ±0,03
Hemoglobin, g/l	86,40 ±0,04	84,95 ±0,05	86,17 ±0,02	87,15 ±0,02	86,25 ±0,07	84,16 ±0,02***	83,95 ±0,04***	86,27 ±0,05	86,35 ±0,04	84,93 ±0,02	86,12 ±0,02	87,19 ±0,03
ALT, μmol/l	0,06 ±0,02	0,07 ±0,03	0,07 ±0,01	0,08 ±0,02	0,05 ±0,02*	0,05 ±0,02***	0,06 ±0,04***	0,06 ±0,06**	0,05 ±0,01*	0,06 ±0,01*	0,06 ±0,03*	0,08 ±0,01
AST, μmol/l	2,41 ±0,03	2,45 ±0,01	2,64 ±0,03	2,83 ±0,02	2,21 ±0,02***	2,12 ±0,01***	2,24 ±0,05***	2,52 ±0,02**	2,30 ±0,2**	2,25 ±0,01**	2,51 ±0,03**	2,78 ±0,24

Notes: * P<0,05; ** P<0,01; *** P<0,001

Results. The interactions of different groups of parasites with each other and with their hosts are based on a very subtle biochemical and molecular biological mechanism. To further understand the mechanism of parasite-host relationships, it is necessary to carefully study the nature of these mechanisms. By determining the biochemical dysfunctions of organs and tissues, it is possible to clarify the picture of changes in the host's metabolism and the influence of different stages of parasite development. By studying the mechanism of changes occurring in individual metabolic links in organs and tissues of the host damaged under the influence of the parasite or at various stages of its development, it is possible to prepare the scientific basis for the treatment and prevention of the disease.

The results of the study show that the total protein, concentration of albumin and globulin in the blood of healthy geese (*Anser anser domesticus*) increases depending on the age of the birds. The total protein in the blood of 10-day-old geese is 32,9 g/l, concentration of albumin – 12,4 g/l, and globulin – 20,2 g/l. In 20-day-old birds, these figures are 40,3 g/l, 17,8 g/l, and 2,5 g/l. The number of leukocytes decreases in contrast to the number of erythrocytes (Table). It was found that with associative invasions in the blood of geese with increasing age of the birds, the amount of total protein, albumin, and globulins decreases compared to the control. The number of indicators in the blood does not return to normal even in the post-patent period of invasion.

A statistically significant decrease in the amount of hemoglobin compared to the control occurs on the 13th and 15th days (84.16 g/l, and 83.95 g/l, respectively). A statistically significant increase in the number of leukocytes compared to the control occurs on the 10th and 15th days. The activity of ALT and AST decreases and does not return to normal even after the end of the invasion.

During the associative invasion of geese, amprolium restores the morphological and biochemical parameters of the blood of birds. In geese, the amount of albumin and globulin decreases with age compared to the control. There are no statistically significant changes in the number of leukocytes and hemoglobin compared to the control. The number of red blood cells in the blood of 10- and 13-day-old treated chickens decreases. On the 15th day, the number of red blood cells returns to normal. At this time, a decrease in the activity of transaminase enzymes was also recorded. On the 20th day, enzyme activity returns to normal. Thus, it was revealed that amprolium restores changes in biochemical parameters to the physiological norm.

References

1. Levine, N. D. 1985. Veterinary protozoology. Iowa State University
2. Press, Ames, Iowa, 139 p.
3. Soulsby E. J. L. 1982. Helminths, arthropods and protozoa of domesticated animals, 7th ed. Lea and Febiger, Philadelphia, Pennsylvania, 653 p
4. Pecka Z. Life cycle and ultrastructure of *Eimeria stigmosa*, the intranuclear coccidian of the goose (*Anser anser domesticus*). *Folia Parasitol (Praha)* 1992; 39, p.105-114.
5. Richter, D., Wiegand-Tripp G., Burckhardt E. Natural infections of *Cryptosporidium* sp. in farm-raised ducks and geese // *Avian Pathol.*, 1994, 23, p. 277-286.
6. Patton W. H., Schwartz L. D., Babish J. G., Lisk D. J. Use of amprolium for the control of coccidiosis in pheasants. *Avian Dis.*, 1984 Jul-Sep; 28(3):693-9.
7. Chapman H.D., Barta J.R., Blake D., Gruber A., Jenkins M., Smith N.C., Suo X., Tomley F.M. (2013) A selective review of advances in coccidiosis research. *Adv Parasitol* 83:93–171.
8. Ruff MD, Garcia R, Chute MB, Tamas T. Effect of amprolium on production, sporulation, and infectivity of *Eimeria oocysts*. *Avian Dis.* 1993 Oct-Dec; 37(4):988-92.

9. Sabatakou O., Paraskevakou E., Tseleni-Balafouta S., Patsouris E. Histochemical study of alkaline phosphatase activity in the chicken intestine // Bulgarian Journal of Veterinary Medicine, 2007, v.10, №2, p.83-93.
10. Bolotnikov I.A. Soloviev Yu.V. Avian hematology. L. Science, 1980.114 p.
11. Kolb V.G., Kamyshnikov V.S. Clinical biochemistry. Minsk, Belarus, 1976, p.5-112.
12. Kochetov G.A. Practical guide to enzymology. M. Higher School, 1980, p. 224-225.

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SUMMARY

In this research, we studied the effect of the coccidiostatic drug - amprolium in associative infestation of geese (coccidia + helminths) on some biochemical and morphological parameters of the blood of healthy, sick, and treated birds. The count of erythrocytes, leukocytes, hemoglobin concentration, and leukocyte formula were calculated, and the activity of alanine aminotransferase and aspartate aminotransferase in 10-20-day-old goslings (*Anser anser domesticus*) was determined. It was revealed that the amount of total protein, albumin, and globulin in the blood of healthy geese increases depending on the age of the bird, and in case of associative invasions with age, the amount of total protein, albumin, and globulin decreases. The sum of indicators in the blood does not return to normal in the post-patent period of invasion. It was also revealed that the activity of ALT and AST decreases during bird infestation and does not return to normal even after the end of the disease. In the case of associative infestation of geese, the drug amprolium restores the morphological and biochemical parameters of the blood of birds.

Keywords: geese, activity, total protein, amprolium, blood.

