

Immuno-biological reactivity to fascioliasis in Sheep

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Abstract

Despite obvious achievements, at the present stage of application of antigelminthics there are also some failures and complications. First of all, it concerns the increase of resistance of some helminths to anthelmintics and development of animals' excessive sensitivity and even intolerance to anthelmintics. Clarification of by-effects mechanism during deworming and comprehensive study of anthelmintics, influence on microorganisms are of special interest and have important practical value. Setting the task of studying of immune-biological reactivity during trematodosis we limited ourselves to the spontaneous course of the helminthoses which are most often found in the North Caucasus. Modern achievements in immunology have largely changed existing ideas about the organism's immune reactivity, its specific and non-specific protective and adaptive mechanisms. It is known that the immune system not only protects the organism from various agents, but also controls its antigenic homeostasis, the processes of differentiation and cell proliferation. Studies in this area have found that immune disorders during helminthosis are not limited to changes in humoral immunity, but are accompanied with pronounced violations of the cellular link of immunity. Changes in T-cell functions are associated with the presence of a soluble immune suppression factor in blood, including helminthosis disease. Defects of natural resistance of an organism may be the result of development of its specific immune answer, in particular, as the exposure of T-lymphocyte-suppressors. Pilot studies show that during any parasitic disease the suppression leads to heavier course of disease. Tetrapsychol, cuprichol and neutrophilin immune-protective properties are given in this article. Positive results on determination of the immune-stimulating properties of a neutrophilin on sheep have been received. Medicine under research causes stimulation of immunity cellular link.

Keywords: immune-biological reactivity, cuprichol, tetrapsychol, neutrophilin, T-lymphocytes, B-lymphocytes.

Introduction

Today many factors demonstrating the repressing action of anthelmintics on immune-reactivity of animals to an organism have been collected. It has been shown that deworming leads to fast release of an organism from the pathogen and thus interferes in the development of full-fledged immunity (Rekhviashvili, 2002; Kennedy et al., 2020; Kokaeva et al., 2020).

Thus, the necessity of carrying out special pilot studies for the purpose of determination of the immune status after anthelmintic therapy is obvious since all researches in available literature are alike and have been held only on experimentally infected animals. We have studied the efficiency of anthelmintic therapy on immunological indicators of the animals which had been spontaneously infected with trematodes (Rekhviashvili, 1998; Sethy et al., 2017; Yuldashbaev et al., 2020).

Material and methods

The research was conducted on private farms in the North Caucasus. In the process of research, the authors used the following methods (Daugaliyeva, 1997; Rekhviashvili, 2005; Rekhviashvili et al., 2015).

Methodology- evaluation of T-lymphocytes was performed using the Jondal method (1984). Cuprinol (*Cupricholum*) - trematodozy the anthelmintic. It is effective for fascioliasis and microcelliosis of ruminants. Low-toxic substance, has a weakly expressed accumulation, does not have embryotoxic, teratogenic and mutagenic effects. The source or name of manufacturer of neutrophilin is digidrokwertitin Russian production.

On the first stage we studied cuprichol's influence on immune-biological reactivity of sheep which were spontaneously infected with fasciola and wild celia. 12 sheep under experiment were divided into two groups: sheep of the first group were spontaneously infected with fasciola and wild celia; animals of the second group were clean from helminths according to coproovoscopy.

Results and Discussion

Blood tests were conducted before deworming and on the 10th and the 30th day after deworming (table 1). Previous researches showed that cuprichol had no negative effect on animals' organism, but nevertheless it did not raise their immune status. On the second stage we studied tetrapyschol influence on immune-biological reactivity of animals. Under research there were also 12 sheep: animals of the first group were spontaneously infected with trematodes (fasciola, wild celia and paramphystoma) and in the second group there were non- infected animals. Immunological researches were held before deworming and on the 10th and 30th day after it (table 2).

Table 1. Immunological indicators of sheep blood which were spontaneously infected with fascioliasis and microcelliosis and then dewormed with cuprichol

Name of tests	1 - group	2- group
Before deworming		
T-lymphocytes, %	13.4±1.2	25.5±2.7
T-helperies, %	5.6±0.9	14.4±1.2
T-supressories, %	7.2±0.1	5.6±0.9
B-lymphocytes, %	9.5±0.1	17.2±1.1
Geterophilic agglutinins, %	1.8±0.9	4.2±1.1
Complementary activity, %	3.4±1.1	6.7±0.5
10 th day after deworming		
T-lymphocytes, %	13.0±1.8	22.4±6.6
T-helperies, %	5.0±1.2	14.4±1.2
T-supressories, %	8.4±1.6	4.3±0.9
B-lymphocytes, %	9.0±0.4	16.8±3.6
Geterophilic agglutinins, %	1.1±0.1	4.4±0.1
Complementary activity, %	2.8±0.9	7.0±0.6
30th day after deworming		
T-lymphocytes, %	15.6±2.2	25.8±3.4
T-helperies, %	7.4±2.8	14.2±3.8
T-supressories, %	7.8±1.6	4.6±0.9
B-lymphocytes, %	12.4±0.4	17.4±2.2
Geterophilic agglutinins, %	1.8±0.2	4.8±1.4
Complementary activity, %	4.4±0.4	7.4±0.9

Table 2. Immunological indicators of sheep blood, dewormed with tetraptyhol

Name of tests	1 - group	2- group
Before dewarming		
T-lymphocytes, %	21.2±0.9	34.8±13.2
T-helperies, %	8.3±1.8	17.6±3.1
T-supressories, %	9.4±3.2	6.4±1.2
B-lymphocytes, %	13.4±1.9	21.6±4.2
Geterophilic agglutinins, %	3.4±1.2	6.8±0.9
Complementary activity, %	4.0±0.8	10.9±0.5
on the 10th day		
T-lymphocytes, %	20.4±0.8	38.2±11.4
T-helperies, %	6.2±0.4	19.2±1.9
T-supressories, %	13.8±3.4	6.0±0.9
B-lymphocytes, %	13.0±2.4	24.4±3.8
Geterophilic agglutinins, %	3.0±1.1	7.2±0.8
Complementary activity, %	3.4±1.2	8.4±0.5
on the 30th day		
T-lymphocytes, %	24.3±1.1	36.6±4.4
T-helperies, %	6.4±1.2	17.2±6.4
T-supressories, %	14.0±3.4	9.4±1.2
B-lymphocytes, %	18.0±2.2	25.6±7.0
Geterophilic agglutinins, %	3.2±1.4	8.0±1.2
Complementary activity, %	4.2±0.8	6.9±0.4

Our observations made at comparative studying of two anthelmintics influence on immune-reactivity of sheep organism did not leave doubt that anthelmintic therapy has no positive impact on development of immune processes of animals in experimental groups. It should be noted that after sheep deworming with cuprichol the suppression of proliferation of lymphoid elements and activity of metabolic processes were observed.

Due to the obtained data, we were interested in conducting the adjusting animal therapy with immune-stimulator neutrophilin. For this purpose 10 lambs at the age of 7-8 months, free from trematodes, were under experiment, animals were divided into 2 groups: animals of the 1st group (5 heads) were treated with neutrophilin in a dose 0.1 mg/kg, orally, during 4 days; in 21 days the therapy was repeated, the animals of the second group (5 heads) served as control ones and were free from medicine. During the experiment coproovoscopic researches and blood sampling for definition of immunological indicators of animals were made (table 3).

Table 3. Amount of trematode eggs/g of lambs' feces

№ of groups	Number of animals	Months of researches			
		Before experiment	2 nd month	4th month	5th month
1	1	-	-	-	12
	2	-	-	-	-
	3	-	1	10	17
	4	-	-	-	-
	5	-	-	5	15
2	1	-	7	27	67
	2	-	-	14	82
	3	-	-	-	1
	4	-	12	42	64
	5	-	-	1	23

As it can be seen from the tables given above two lambs from the first group were free from invasion, the amount of trematode eggs of the other animals was lower, than of animals of the second group. Immunological indicators are given in table 4.

Conclusion Analyzing the data obtained, it should be noted that the administration of neutrophilin at a dose of 0.1 mg/kg orally increased the immune status of animals and reduced the survival rate of helminths, and cuprichol does not have a negative effect on the animal body, but does not increase the immune status.

Table 4. Immunological indicators of animals under experiment and in control group

Name of tests	Groups of animals	
	1 - group	2- group
Before the experiment		
T-lymphocytes, %	32.4±4.4	34.6±2.2
T-helperies, %	19.2±3.2	18.2±1.9
T-supressories, %	4.6±0.8	5.2±1.6
Macrophages, %	56.2±7.4	48.6±2.4
B-lymphocytes, %	19.8±2.2	18.8±1.1
Immunoglobulins M, мг/мл	2.0±0.4	2.1±0.2
Immunoglobulins, мг/мл	23.6±0.4	25.1±0.4
In 2 months		
T-lymphocytes, %	35.6±7.7	31.2±4.6
T-helperies, %	18.8±2.9	14.4±7.2
T-supressories, %	6.2±0.9	9.4±4.1
Macrophages, %	44.5±6.8	40.2±3.0
B-lymphocytes, %	23.2±1.8	24.1±2.4
Immunoglobulins M, мг/мл	2.45±0.2	2.3±0.1
Immunoglobulins, мг/мл	25.1±0.2	23.3±0.4
In 4 months		
T-lymphocytes, %	34.2±6.6	22.6±4.3
T-helperies, %	16.2±1.7	10.2±2.2
T-supressories, %	7.7±1.2	10.8±1.8
Macrophages, %	59.4±7.8	40.1±4.4
B-lymphocytes, %	27.4±1.1	20.8±2.2
Immunoglobulins M, мг/мл	2.3±0.1	2.23±0.2
Immunoglobulins, мг/мл	24.3±0.2	19.3±0.5
In 5 months		
T-lymphocytes, %	34.8±4.2	23.1±3.8
T-helperies, %	17.4±3.6	8.3±1.2
T-supressories, %	8.0±2.2	14.3±0.9
Macrophages, %	52.2±13.4	39.0±3.8
B-lymphocytes, %	25.4±7.2	18.2±1.1
Immunoglobulins M, мг/мл	2.4±0.2	1.79±0.4
Immunoglobulins, мг/мл	23.8±0.4	20.7±0.5

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