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Study Of Hepatoprotective Effect Of The Drug In Toxic Liver Dystrophy Of Piglets

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ABSTRACT

Currently, there are a large number of ways to prevent and treat toxic liver dystrophy. Given that tissue hypoxia plays a significant role in the pathogenesis of damage to hepatocytes, leading to disruption of mitochondrial functions, depletion of ATP reserves with the activation of free radical processes, the inclusion of drugs containing mitochondrial substrates - succinic acid (succinate) is promising from the position of additional influence on the course of ischemic processes in the hepatocyte, in addition, it has been proved that it and its derivatives have an antioxidant effect. The aim of this study was to determine the etiological factors, to study the effectiveness of the new product, including succinic acid and organic phosphorus compound, and its effect on the clinical and physiological status, some hematological parameters, as well as the productivity of piglets in toxic liver dystrophy. Our studies have found that the etiological factors of toxic liver dystrophy in piglets in the experimental farm are exogenous intoxication, lack of feed selenium, methionine and vitamin E. The use of study drug intramuscularly three times at doses of 0.3 and 0.5 ml / kg in addition to the adopted in the economy scheme of treatment had a stimulating effect on haematopoiesis of pigs, which was reflected by the end of the experiment increased levels of hemoglobin, number of erythrocytes compared to the control, adjust protein metabolism, and carbohydrates for piglets, contributed to the normalization of the functional state of the liver. There was also a stimulating effect on the productivity and safety of piglets, with a more pronounced effect was caused by the use of the studied means at a dose of 0.5 ml/kg live weight.

Keywords: piglets, toxic dystrophy, liver, etiology, succinic acid, treatment, selenium, blood, symptoms, productivity

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INTRODUCTION

Currently, pig breeding plays a major role in providing the population with food, as pigs are one of the most precocious animals. Meanwhile, one of the problems in pig-breeding enterprises is the disease of young animals. These diseases are of mixed nature, mass character and cause great economic damage to farms. Large enterprises toxic hepatobillary found all year round and is often combined with pathology of other organs that leads to mortality of piglets [1]. Currently, there are a large number of ways to prevent and treat toxic liver dystrophy. Given that tissue hypoxia plays a significant role in the pathogenesis of hepatocyte injury, leading to mitochondrial dysfunction, depletion of ATP reserves with the activation of free radical processes, the inclusion of drugs containing mitochondrial substrates - succinic acid (succinate) is promising from the position of additional influence on the course of ischemic processes in the hepatocyte, in addition, it has been proved that it and its derivatives have an antioxidant effect [2,3,4]. Thus, the development of new methods of prevention and treatment of toxic Piglet dystrophy is very relevant.

The purpose of this study was to determine the etiological factors, to study the effectiveness of the new drug and its impact on the clinical and physiological status, some hematological parameters, as well as the productivity of piglets in toxic liver dystrophy.

MATERIALS AND METHODS

Experimental studies on the effect of the Yantovet drug on the clinical and hematological status and productivity of weaned piglets were carried out in the pig farm of the Baltasinsky district of the Republic of Tatarstan and at the Department of Therapy and Clinical Diagnostics with Radiology of the FBOU IN Kazan named after NE Bauman. The object of the study was a new composition developed at the Department of Therapy and Clinical Diagnostics with X-ray, including succinic acid and organic phosphorus compound [5, 6]. To study the effect of the test preparation, piglets of 2 months old, a large white breed with a diagnosis of toxic liver dystrophy, were selected, of which three groups of 15 animals each were formed according to the principle of steam-analogues.

The diagnosis was established on the basis of anamnestic, clinical and hematological parameters. Clinical examination was carried out daily, and blood sampling and hematological analysis was performed before the start of the experiment and every ten days. Early in the morning, blood was taken from the cranial vena cava and the orbital venous sinus.

In order to determine the etiological factors, the soil was sampled in the economic use zone, as well as the average samples of the feed used to determine the content of some trace elements, in addition, the presence and concentration of mycotoxins were evaluated in the feed. The determination of trace elements in the soil was performed by the atomic absorption method on an Anylist 400 atomic absorption spectrometer (USA).

In order to evaluate the therapeutic efficacy of the studied drug in addition to the treatment of toxic dystrophy adopted in the household, which includes the use of the drug E-selenium in standard doses, we additionally applied the test drug that the first test group was injected intramuscularly into the neck three times during the experiment with an interval of 7 days at the rate of 0.3 ml / kg, the second - 0.5 ml / kg, the third served as a control. The experiment was carried out for 30 days.

In whole blood, the hemoglobin content was determined by the unified hemoglobin cyanide method, the total number of erythrocytes, leukocytes, and the leukocyte formula was determined by standard methods. Biochemical studies included the diagnosis of toxic liver dystrophy and an assessment of the effectiveness of the studied drug according to some biochemical parameters: total protein content, albumin and globulins, glucose, cholesterol and triglyceride concentrations, aspartate aminotransferase (AST) activity, alanine aminotransferase (ALT), and the concentration of the blood glucose content of the blood glucose content (AST); (GGT), the level of total bilirubin, which are carried out on the biochemistry analyzer "BiochemSA".

Weighing was performed before and after the experiment to determine the average daily weight gain of animals. Take into account the safety of animals.

The data obtained as a result of the research were subjected to variation-statistical processing using the Student's criterion of reliability on a personal computer using Microsoft Excel.

RESULTS AND DISCUSSION

The main cause of toxic liver dystrophy is fodder intoxication caused by feeding animals affected by mold fungi and spoiled feed. Feeding of young piglets on the farm is carried out with dry feed of own production. We carried out a mycotoxicological analysis of animal feeds, where mycotoxins were determined (T-2 toxin, aflatoxin, DON, Zearalenone, Ochratoxin A). Acute toxicity in these feeds was not detected, the concentration of mycotoxins corresponded to the MPC. However, it can be assumed that the total effect of mycotoxins could have a pathological effect on the liver and contribute to the development of the pathological process [7].

Also, this disease is often registered in areas characterized by a deficiency of digestible forms of selenium in soils [8,9]. The northern regions of the Republic of Tatarstan are a selenium-deficient biogeochemical province, including the Baltasinsky district. Our research has shown that both in the soil and in feeds made from local raw materials, selenium levels are insufficient, which is one of the reasons for the appearance of toxic liver dystrophy in this economy. The content of selenium in the soil was 0.05 mg / kg, in feed, 0.01 mg / kg, which is below the optimum values.

It is known that the cause of toxic liver dystrophy can be a violation in the diet of protein-carbohydrate ratio and a deficiency of vitamin E, cystine, methionine and choline in it [10,11]. In this case, a large number of oxidized products that are toxic to the body are formed. The analysis of the diet used for feeding piglets shows that the provision of limiting substances is: in cystine and methionine by 63%, vitamin E - by 85%. Thus, according to the results of the diagnostic stage, a conclusion was made about the causes and distribution of toxic liver dystrophy among weaned piglets under farm conditions.

Clinical studies have established that the condition of all animals was assessed as satisfactory. However, in this age group, about 8% of animals were lagging behind in growth and development, and had reduced food excitability. The yellowness of the mucous membranes and skin did not appear or was very slight. At the same time, the animals were sluggish, depressed, food excitability decreased, vomiting was rarely observed. Patients with piglets experienced a decrease in motor activity, they lay buried in the litter, or took the sitting dog position. Body temperature was within normal limits. The disease was accompanied by tachypnea and tachycardia. The live weight of piglets with signs of toxic liver dystrophy was lower by 8-10% compared with clinically healthy peers.

When observing experimental animals with toxic liver dystrophy, who received the test scheme, it was established that the clinical manifestation of the disease in them was smooth. In the future, the clinical condition of the animals returned to normal, as evidenced by the clinical status indicators. As a result of the use of the studied drug, the clinical signs were eliminated faster in the piglets of the experimental groups compared to the control ones, and the hematological indices normalizing the development of toxic liver dystrophy were normalized, which indicates its effectiveness in the given disease.

In the initial state and after the use of the drug, piglets were bled to determine morphological parameters. From the data obtained it can be seen that the number of erythrocytes, hemoglobin in the background study did not have statistically significant differences in the groups formed and fluctuated within the lower bounds of the physiological norm. Significant changes in all morphological indicators were expressed only by the end of the experiment on the 30th day, when the differences between the experimental and control groups were significant. Thus, for the period of the experiment, the hemoglobin level in the experimental groups increased by 23.5 and 31.3% and was higher by the end of the experiment than in the control by 16.8 and 26%, respectively. A similar trend continued with respect to the number of erythrocytes, the increase in the number of which for 30 days of the study was 15.3 and 20.1%, respectively, compared to the background, while in control animals the level of this group of cells remained almost unchanged.

At the beginning of the experimental period, the number of leukocytes in all piglets was below the normative values, which may indicate a suppression of lymphopoiesis, in the experimental groups during the

experiment the number of leukocytes slightly increases and reaches the lower limits of the physiological norm, which can be regarded as a positive trend. In the control group, these changes are less significant, on the 20th and 30th days of the experiment the difference between the experimental and control groups is 11.8 and 7.5%, respectively.

When analyzing the leukocyte formula at the beginning of the experiment, eosinopenia and neutrophilia were established by increasing segmented neutrophils, over the study period, similar changes occurred in all groups: the level of eosinophils and lymphocytes increased, segmented neutrophils decreased within the age physiological norm.

For laboratory confirmation of toxic liver dystrophy and further control of the effectiveness of the drug, biochemical blood tests were performed.

A baseline study found that the total protein content was at the lower boundary of the physiological standards, with the level of albumin significantly reduced, and the amount of glucose in the blood was also reduced, indicating a decrease in the synthetic function of the liver.

The determined functional liver markers in the blood of experimental animals indicated the presence of pathology in this organ, the total bilirubin content, the activity of the enzymes AST, ALT, GGT were increased. All biochemical parameters in piglets from both the experimental and control groups were similar and the difference was not statistically significant.

Thus, biochemical analysis confirmed the results of a clinical study and morphological analysis of blood, which allowed a complex diagnosis of toxic liver dystrophy. Later on, every 10 days, similar tests were performed.

The use of the studied agent for the correction of toxic hepatodystrophy to piglets contributed to the improvement of blood biochemical parameters characterizing the state of protein metabolism in animals. Thus, a fairly low level of total protein increased in all groups, but in the experimental groups the increase was more dynamic and from the 20th day there was a statistically significant difference compared with the control group, which at the end of the experiment was 10.12-19.65%. A similar trend has been established for albumin levels. So, the difference of its quantity in the first experimental group with respect to the control was the highest on the 20th day of research and amounted to 25.4%, in the second - on the 30th day of the experiment (25.8%), whereas in animals of the control group the level at all periods of research was below the physiological norm.

Glucose level at the beginning of the experiment was below the physiological norm and its increase was observed in both groups, presumably with the start of treatment, but more pronounced dynamics occurred in groups where the study drug was additionally used. The indicator was higher compared with the control, respectively, the duration of the study was higher by 38.1; 24.89; 29.15% in the first experimental group, by 44.4; 33.9 and 30.5% - in the second. By the end of the experiment, the glucose level was within the reference values of all animals.

Hypopholesterolemia with exogenous intoxications may be due to a decrease in cholesterol synthesis and, probably, some impairment of its absorption from the intestines, including those associated with diarrhea. In the background study, a low level was observed in all the experimental piglets, but in the experimental groups throughout the entire study period, the indicator increased. By the end of the experiment, its concentration rises within the standard values and is significantly higher than in the control group.

The hepatoprotective effect of the treatment and the physiologically determined compensatory properties of the liver parenchyma led to the normalization of pigment metabolism. Increased at the beginning of the study by 20-25%, the level of total bilirubin in sick animals under the influence of the studied drug decreased in accordance with the study periods by 1.2-8.8; 5.33-19.85; 32.2 - 33.6% compared with the control, reaching the upper bounds of the physiological norms in the experimental groups, whereas in the control it changed slightly and was higher than the standards throughout the experiment.

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Table - Enzyme Activity - hepatic markers in the blood of piglets suffering from toxic liver dystrophy

Indicators	Groups	Terms of research, days			
		background indicator	10	20	30
Total bilirubin, mkmol / l	1 group	12,18±0,51	10,80±0,68	8,72±0,46**	7,66±0,28**
	± over control		-8,8	-19,85	-32,2
	2 group	10,94±0,43	11,98±0,41	10,30±0,59	7,5±0,34**
	± over control		1,2	-5,33	-33,63
	control	11,84±0,65	11,84±0,65	10,88±0,53	11,30±0,61
Alkaline phosphatase, E / l	1 group	148,20±21,74	168,00±15,57	194,00±6,29	173,40±12,13
	± over control	-10,83	-18,21	-0,72	-5,15
	2 group	184,20±9,28	178,00±10,88	192,40±10,54	158,80±1,19
	± over control		-13,34	-1,54	-13,13
	control	166,20±16,61	205,40±9,52	195,40±11,84	182,80±9,23
ALT, E/l	1 group	81,40±2,71	64,20±4,89	48,20±1,92**	43,00±2,76**
	± over control		-12,06	-29,12	-15,7
	2 group	62,40±1,35	63,80±3,42	47,80±2,82	35,60±1,72**
	± over control		-12,6	-29,7	-30,2
	control	76,00±3,26	73,00±1,46	68,00±2,69	51,00±1,94
AST, E/l	1 group	96,60±3,46	82,80±6,37	62,20±2,95**	50,60±1,35**
	± over control		-14,11	-27,34	-39,33
	2 group	85,40±1,68	82,20±2,53	69,40±3,75**	49,2±1,19**
	± over control		-14,73	-18,93	-41,01
	control	97,80±4,19	96,40±2,71	85,60±3,15	83,40±4,78
GGT, E/l	1 group	59,80±2,43	53,20±3,65	31,20±2,46**	31,60±3,33**
	± over control		-22,68	-53,02	-53,12
	2 group	68,60±2,99	58,80±1,52	36,00±1,41**	29,00±1,77**
	± over control		-14,54	-45,78	-56,97
	control	64,00±2,74	68,80±3,44	66,40±2,59	67,40±4,16

In assessing the biochemical analysis of blood in patients with hepatic pathology, cytolysis syndrome is identified, caused by impaired permeability of cell membranes, disintegration of membrane structures or necrosis of hepatocytes with access to enzyme plasma (ALT, AST, GGT, LDH, etc.). The most common in clinical laboratory practice are the first three. The dynamics of changes in the activity of certain enzymes in the serum of experimental pigs are presented in the table.

In the course of the experiment, a decrease in the activity of enzymes occurred in all groups under the influence of the prescribed treatment, but more noticeable changes occur in the experimental groups. So at the beginning of the study, the ALT activity exceeded the standard values almost twice in all experimental piglets, with a therapeutic effect on the experimental animals, the decrease compared to the control is 15.7–30.2% and reaches the upper limits of the reference values.

A similar trend is observed in relation to the activity of the AST enzyme, the increase in which was above the norm by 40-50%. And by the end of the study period in the experimental groups, this indicator reached physiological values, whereas in the control changes were very insignificant. An increase in the activity of ALT and AST was a reliable marker of liver damage. However, increased ALT activity is considered more specific for liver damage. AST except the liver is contained in almost all organs and, in particular, in the heart, as a result, the increase of this aminotransferase is not always specific for liver damage. Therefore, the ratio AST / ALT ratio has a clinical significance. At the beginning of the experiment, on average in groups it was 1.16, which is below the norm.

The activity of GGT was significantly increased by the beginning of the experiment, under the influence of therapy in both experimental groups, the indicator decreased by almost 2 times by the end of the experiment and returns to normal, whereas in the control group it remains at a sufficiently high level.

The use of the drug stimulated productive qualities, a month after the start of the experiment, there was a tendency to an increase in the average daily weight gain in animals of the experimental groups, which exceeded those of their peers from the control group by 5.88% and 8.00%. This dynamics persisted in the subsequent month of observation, where the average daily weight gain of piglets was higher than in the control, respectively, by 6.35 and 9.86%.

CONCLUSION

Thus, our research has established that exogenous intoxication that occurs when feeding mixed feeds containing mycotoxins, lack of selenium, methionine and vitamin E feeds etiological factors in the occurrence of toxic liver dystrophy of the liver in piglets otymya mice. The application of the studied drug in addition to the toxic treatment of liver dystrophy adopted in the household had a stimulating effect on piglet hematopoiesis, which was expressed by the end of the experiment by an increase in hemoglobin and red blood cell count compared to control, corrected the protein and carbohydrate metabolism of the pigs, contributed to the normalization of the functional state of the liver. A stimulating effect on the productivity and safety of piglets was also obtained, with a more pronounced effect caused by the use of the studied agent at a dose of 0.5 ml / kg body weight.

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