CORRECTION OF METABOLIC PROCESSES UNDER EXPOSURE TO THE PESTICIDE PARARGYTE WITH THE ADDITION OF A PLANT PREPARATION COMPLEX

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Overview (Abstract)

Introductory information/relevance (Background): Widespread prevalence of toxic hepatitis from chemical factors, the growth of chronic forms of the disease, leading to a decrease in working capacity of the working population, determine the multidimensionality of the problem and the relevance of the development of new methods of prevention and treatment using a set of herbal medicines.

Objective: Experimental study of the influence of the pesticide parargyte on the functional state of hepatocytes and correction of metabolic processes with the use of decoction from the complex of plant preparations.

Methods: Experimental studies were carried out on 146 white male rats weighing 190-210. The mechanism of biological action of hepatotropic factors

was studied in acute and chronic experiments and correction of metabolic processes with the addition of plant antioxidants.

Results (Findings): Experimental studies revealed that under the influence of the pesticide propargit was observed a disturbance of carbohydrate energy metabolism in the liver in all study periods. Application of a complex of plant preparations to poisoned animals normalized the carbohydrate energy metabolism and improved the functional state of the liver.

Conclusion: Application of the complex of herbal medicines - nettle leaves, black currant fruits, rose hips, mountain ash fruits, green tea with pesticide poisoning has a hepatoprotective effect on liver metabolism.

Keywords: liver, pesticide parargyte, herbal medicines, carbohydrate energy metabolism.

Introduction.

Today all over the world due to the use of different chemical substances against plant pests in agriculture, the number of patients with different hepatobiliary pathologies is increasing [7, p. 21].

The increase in the number of patients with acute and chronic occupational liver diseases was promoted by regular contact of some agricultural workers with pesticides [6, p. 221; 1, p. 75].

The wide prevalence of toxic hepatitis and the growth of chronic forms of the disease, which lead to the reduction of working capacity, determine the multifaceted problem and the relevance of its study in the metabolic process of metabolism [2, p. 8; 3, p. 182]. This slowly progressing disease proceeds with steady fibrosing of liver tissue, the degree of which is determined by pathobiochemical changes, lipid, carbohydrate, protein and energy metabolism disorders [5, p. 221].

For pathogenetic prophylaxis of the disturbed metabolic processes, for the acceleration of adaptation mechanisms we recommend a new method of specific treatment by application of a complex of plant medicinal substance, which is a part of the phyto tea "Antioxidant" make the most optimal proportion for effective therapy of the toxic liver damage [9, p. 15].

The research purpose. Experimental study of the influence of the pesticide parargyte on the functional state of hepatocytes and correction of metabolic processes with the use of decoction from a complex of plant preparations.

Research materials and methods. Experimental studies were conducted on 146 white rats of males weighing 190-210. The mechanism of biological action of hepatotropic factors was studied in acute and chronic experiments and correction of metabolic processes with the addition of plant antioxidants. The research was conducted by the European Convention for the Protection of Vertebrate Animals used for Experimental and Other Scientific Purposes (Strasbourg, Mar 18 1986) ETS N 123. All animals were kept in the vivarium and the laboratory for medical and biological studies in hygiene at the Research Institute of the Ministry of Health of the Republic of Uzbekistan.

Experimental researches were carried out to study the mechanisms of toxic action of the pesticide parargyte and influence on the biochemical and functional condition of the liver. Experimental studies were conducted on 146 white male rats. Experimental animals were kept in laboratory quarantine for 20 days: control animals were kept in the same conditions as the experimental animals. The animals were given a standard diet with sufficient content of proteins, fats, carbohydrates, vitamins, salts and trace elements. All studied indicators in experimental animals were compared with those in the control group. The mechanism of biological action and correction of metabolic

processes with addition of phyto tea "Antioxidant" was conducted in 3 series of experiments.

The mechanism of biological action of propargite in chronic experience was studied during each 15, 30, 45, 60 and 90 days, and acute experience in 1, 2, 7 and 15 days (only carbohydrate metabolism was studied), as well as correction of metabolic processes with the addition of a complex of plant preparation - phyto tea "Antioxidant", consisting of nettle leaves, black currant fruits, rose hips, fruits of mountain ash, green tea. To determine the effectiveness of dietary supplements in acute poisoning by pesticide on carbohydrate metabolism, studies were conducted on the content of glycogen, lactic and pyruvic acids, glucose in the liver and blood. An acute experiment was conducted on 3 series of white male rats. The first series of animals received the pesticide in the intragastric dose 3/4 LD50 (408,7), in the second series the pesticide was also 3/4 LD50 with the treatment of phyto tea "Antioxidant", the third series was a control one. The concentration of investigated metabolites was determined in 24, 48 hours, seven and fifteen days after a single intragastric administration of pesticides.

The determination of metabolites of carbohydrate metabolism was carried out in a chronic experiment. At repeated administration of the pesticide within 30 days in a dose of 1/20 LD50 (27.5 mg/kg) carbohydrate energy metabolites in the liver were determined. For the correction of metabolic processes in acute and chronic studies in experimental animals, medicinal herbal preparations were used in the form of decoction. Phyto tea decoction "Antioxidant" 1 filter bag was added 200 g of boiling water. After cooling, 1 ml per 100 g of body weight was injected intragastricly.

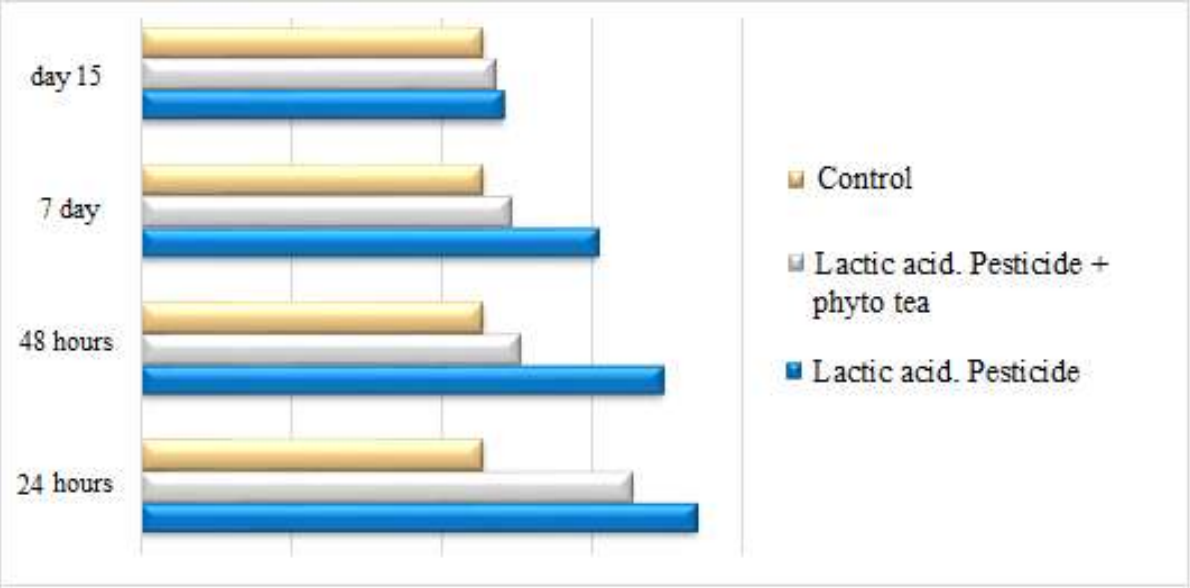
After the end of the experiments the rats were decapitated 1, 2, 7 and 15 days after a single exposure to the pesticide and in chronic experiments 15, 30, 60 and 90 days after the end of the exposure.

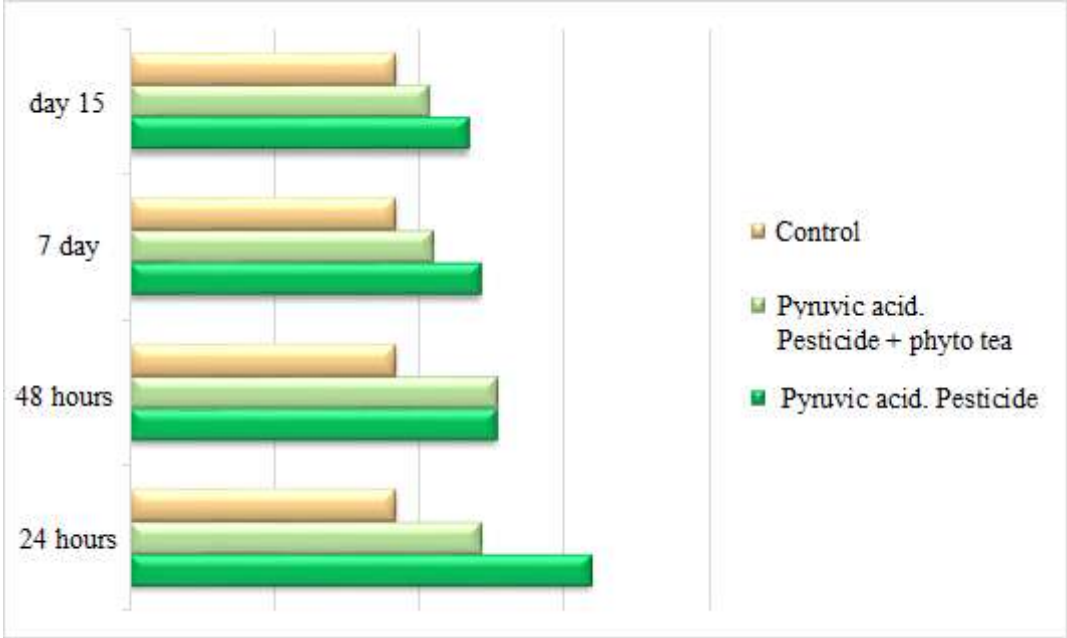
The following substrates were determined spectrophotometrically in liver tissue: pyruvic acid, lactic acid and glycogen [8, p. 15].

Results (Results). The content of lactic acid in the blood (Fig. 1) at exposure to the pesticide for 24, 48 hours and 7 days of experiment increased to 3.70±0.06, 3.47 ±0.024 mmol/l, after 15 days of an experiment it normalized.

When phyto tea "Antioxidant" was introduced, the level of lactic acid in poisoned animals decreased and made 3.26 ±0.067, 2.52 ±0.05, 2.46 ±0.02 and 2.36 ±0.024 mmol/l. In comparison with the experimental ones without treatment and so with the addition of dietary supplements the level of lactic acid approached the control group.

The content of pyruvic acid in the blood during the intragastric administration of the pesticide during the whole period of the experiment increased and made 158.8 ± 8.1; 126.3 ± 4.49; 121.1 ± 7.14 and 116.7 ± 2.76 μmol/l, respectively (91.6 ± 7.5 μmol/l in the control group). When administered to poisoned animals phyto tea "Antioxidant" concentration was reduced to 76.2-93.8% concerning the experienced animals who did not receive phyto tea.


day 15
7 day
48 hours
24 hours
Control
Lactic acid. Pesticide + phyto tea
Lactic acid. Pesticide


day 15
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Control
Pyruvic acid. Pesticide + phyto tea
Pyruvic acid. Pesticide

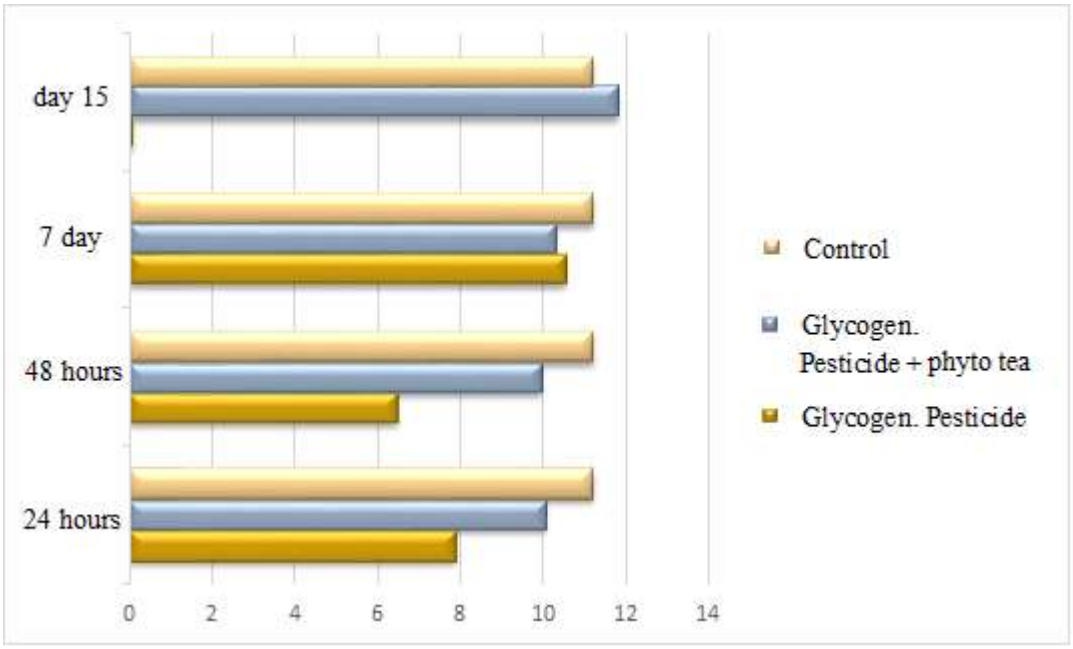


Figure 1: Maintenance of lactic, pyruvic and glycogen in the blood of white rats with acute pesticide poisoning at 408.7 mg/kg with the treatment of "Antioxidant" phyto tea

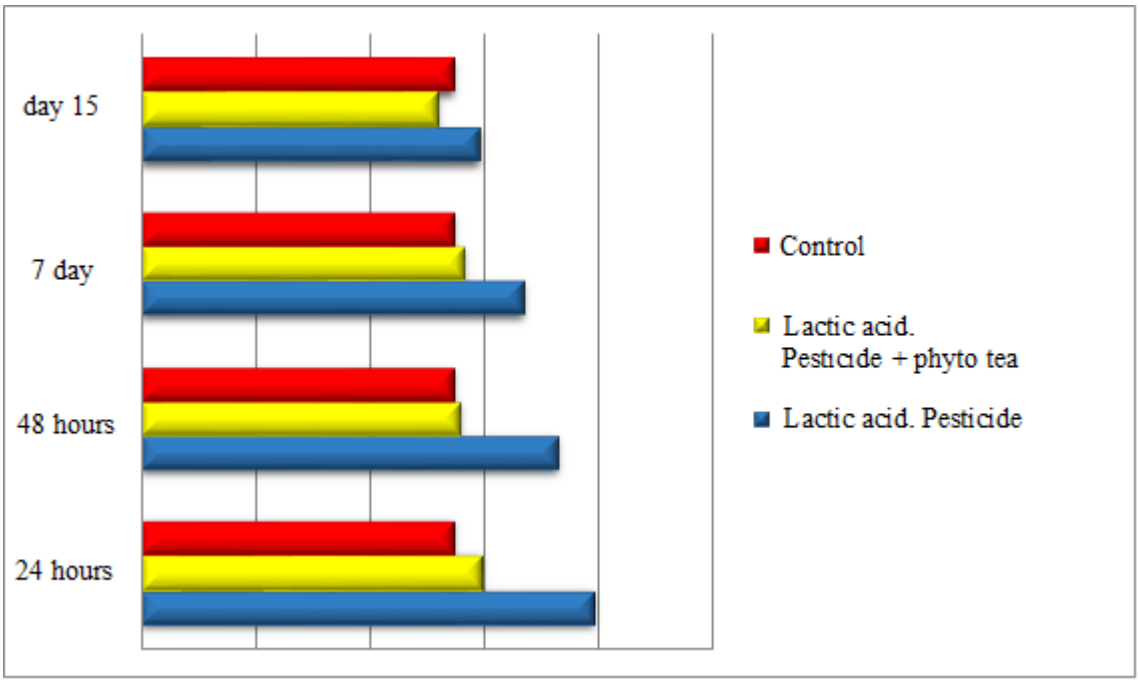
The level of glycogen in the control group was 11.2±1.41 mg%, and when the pesticide was introduced into animals after 24, 48 hours, the level of glycogen decreased to 7.60 ±0.13 and 6.50 ±0.04 mg%, on the 7th and 15th days of experience its content increased and approached the control group. At acute poisoning of animals by pesticide and addition of phyto tea "Antioxidant" glycogen level was restored almost to normal and made 10,05±0,25, 9,94±1,26; 10,3±0,21 and 11,8±0,48 mg%.

Thus, at acute poisoning of animals by pesticide in a dose of 3/4 LD50, there is an accumulation of underoxidized products of metabolites of carbohydrate metabolism and reduction of glycogen content in the blood. When the phyto tea "Antioxidant" poisoned by pesticide is introduced into animals, the restoration of carbohydrate metabolism processes is accelerated and approaches normal levels.

At single intragastric administration of the pesticide, the level of pyruvic acid in liver tissues increased during 7 days of experience, especially a sharp increase in concentration was observed in the initial period of poisoning. In the following 15 days its content decreased and approached the control level (Fig. 2).

When biologically active substances were administered to poisoned animals, the concentration of pyruvic acid sharply decreased and from the 7th day of the experiment was restored to the control level.

The concentration of lactic acid in liver tissue under the influence of pesticide in sublethal dose reliably increased by 24, 48 hours and 7 days of inoculation (3,97±0,044; 3,64±0,03; 3,34±0,03 mmol/g) in comparison with the control group (2,37±0,049 µmol/l); on the 15th day of the experiment its level came close to the control level.



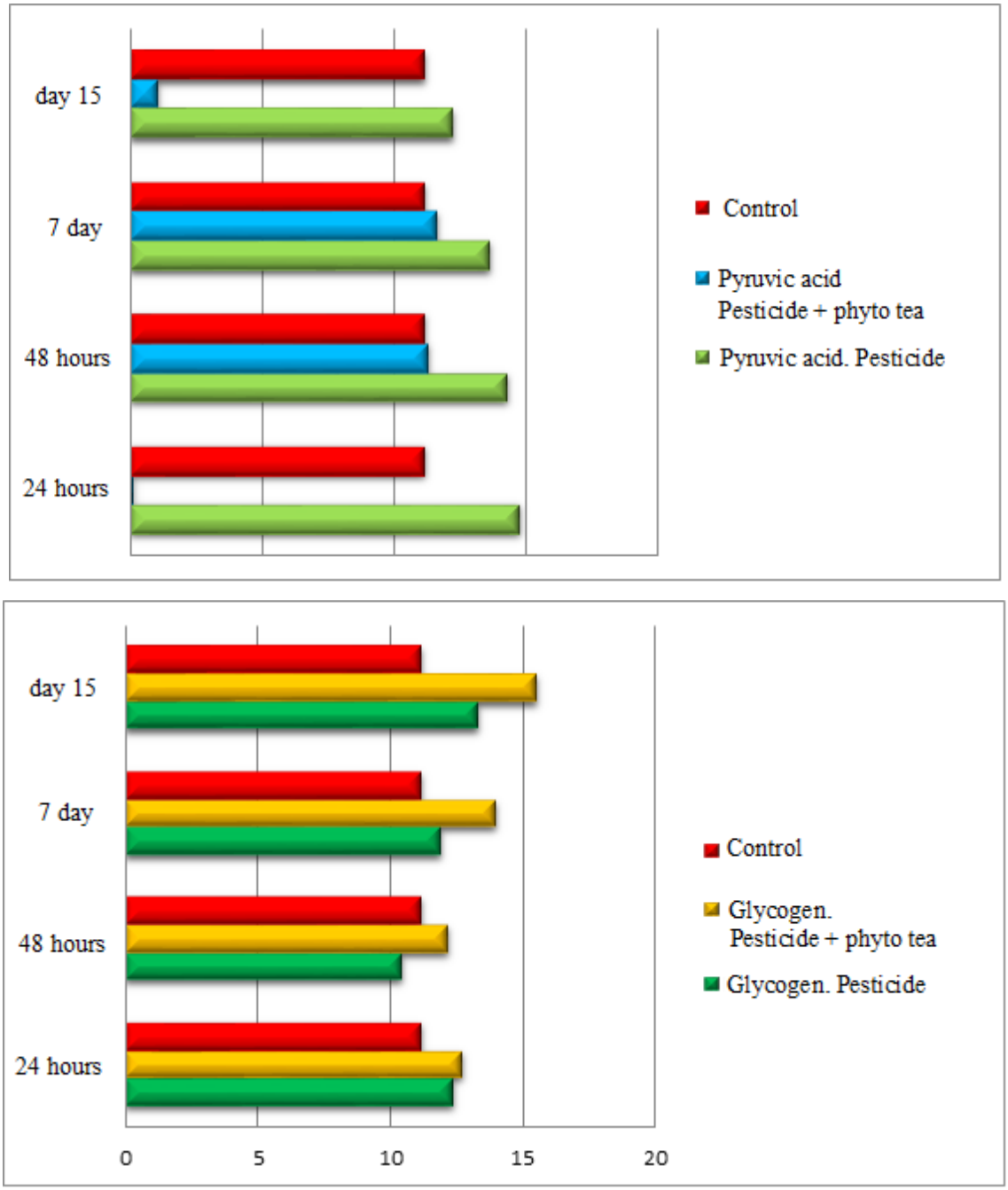


Figure 2: Content of carbohydrate metabolites in liver tissue treatment of white rats in acute pesticide poisoning and treatment with phyto tea "Antioxidant".

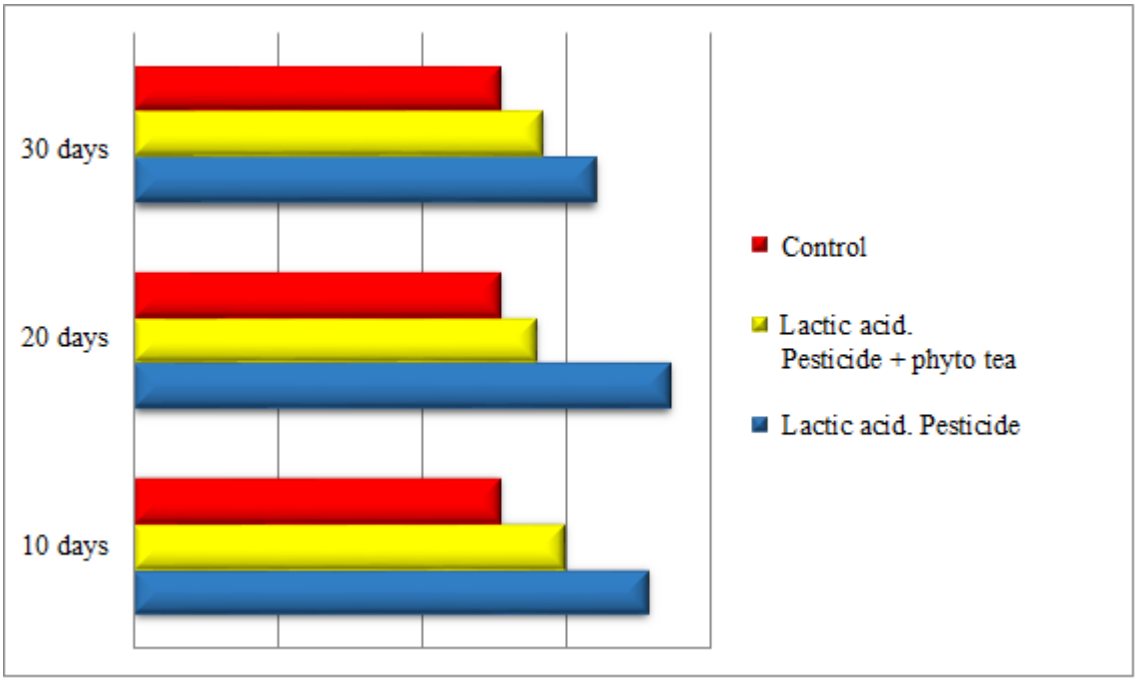
The content of glycogen in liver tissue during poisoning by the pesticide in all periods of the study sharply decreased, especially this was expressed by 48

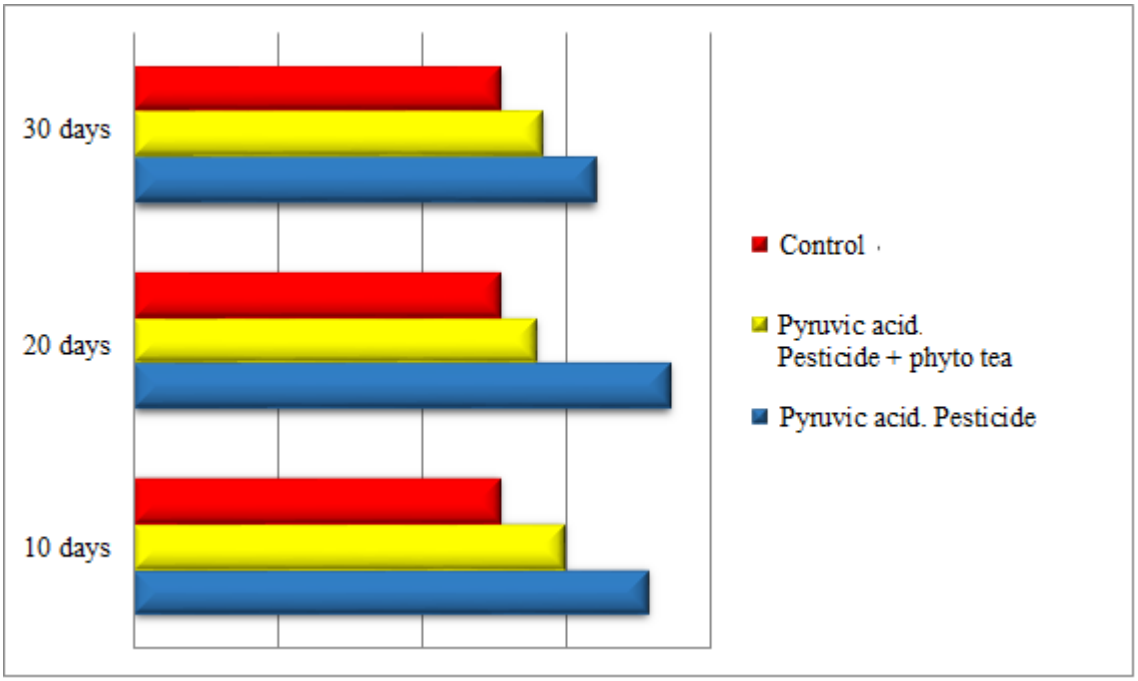
hours, on the 7th day of the experiment, and on the 15th day of the experiment, the content of glycogen came close to the control level.

When phyto tea "Antioxidant" was injected to poisoned animals, it had a more active effect on lactic acid levels in the liver. At the same time in all the terms of the experiment, the lactic acid content was restored to the control group.

Antioxidant" had a corrective effect on the glycogen level and was expressed by 48 hours and 15 days of inoculation. It can be seen from the above mentioned that in case of acute pesticide poisoning of animals the utilization of glycogen in liver tissue increases, as well as the intensity of anaerobic glycolysis increases, oxidative processes of carbohydrate metabolites decrease, resulting in the accumulation of pyruvic and lactic acid concentrations in experimental animals.

Determination of metabolites of carbohydrate metabolism and activity of enzymes involved in the cycle of tricarboxylic acids was carried out on 30, 60, 90 and 120 days of inoculation. At repeated injection of the pesticide within 30 days in a dose of 1/20 LD50 (27.5 mg/kg) the content of pyruvic acid in whole blood from 30 to 120 days of inoculation was reliably increased (149.9±8.17; 157.3±7.81; 154.9±8.31; 166.3±6.13 μmol/l) (Fig. 3). With the addition of phyto tea "Antioxidant" to poisoned animals within 30 days, the level of pyruvate in all periods of experience was declining and approaching the norm.


30 days
20 days
10 days
Control
Lactic acid.
Pesticide + phyto tea
Lactic acid. Pesticide


30 days
20 days
10 days
Control
Pyruvic acid.
Pesticide + phyto tea
Pyruvic acid. Pesticide

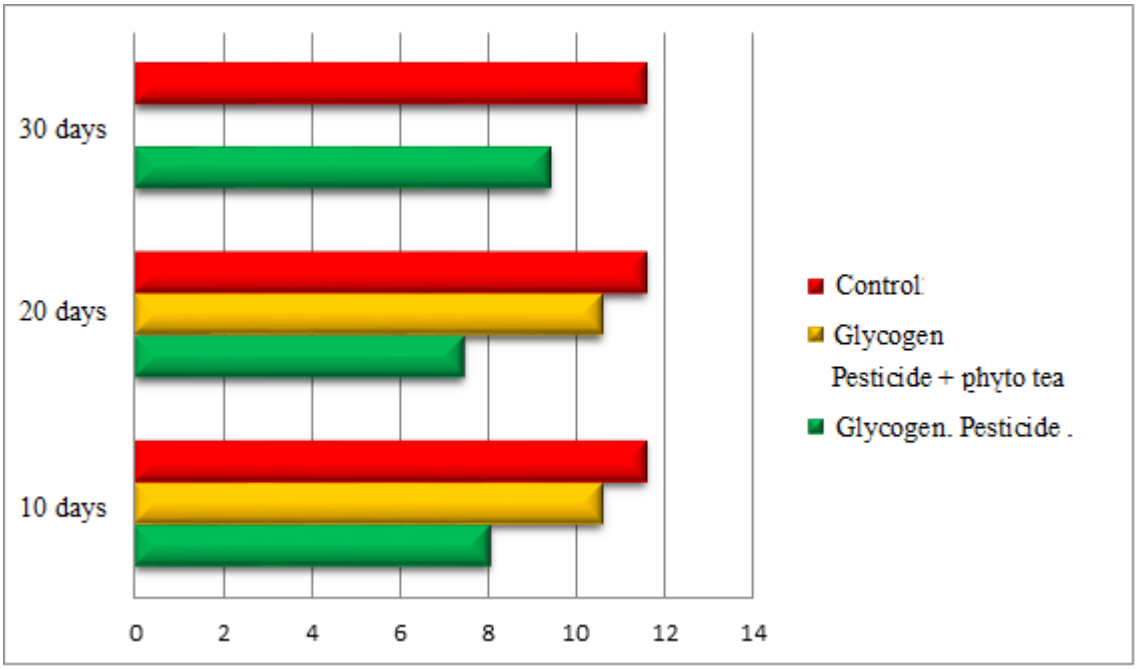


Figure 3: Content of rat blood carbohydrate metabolites in chronic pesticide poisoning and treatment with antioxidant BAA.

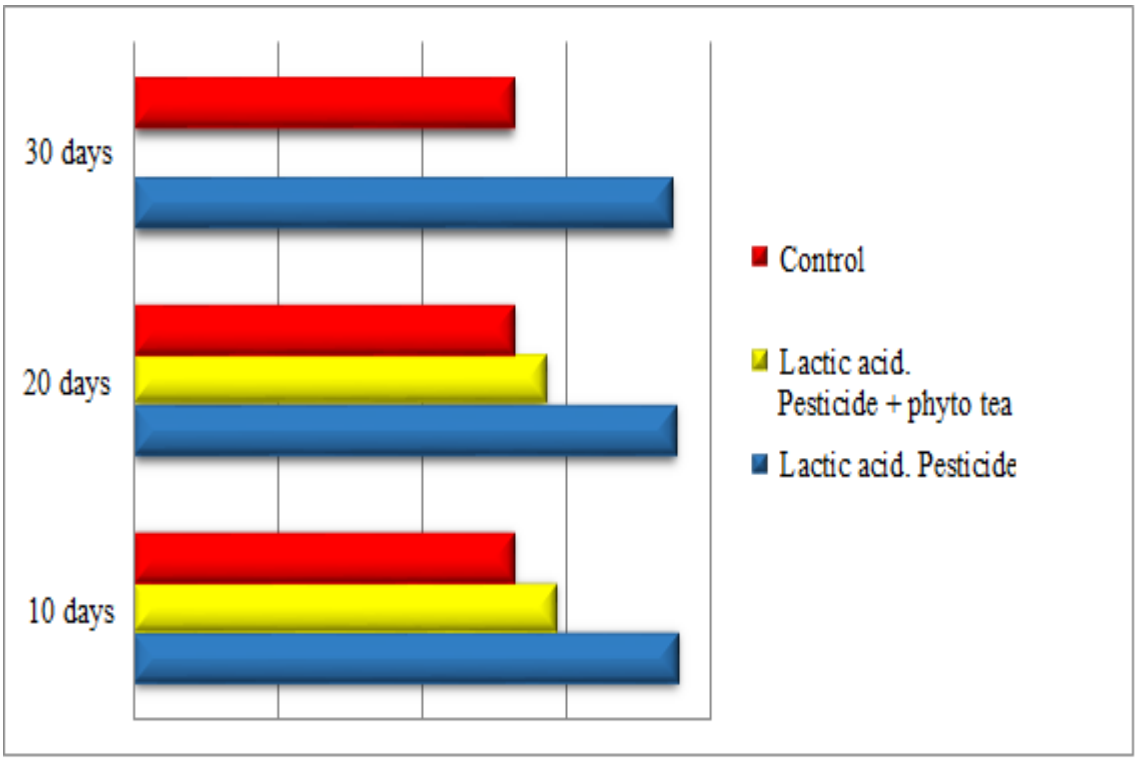
The level of lactic acid in all periods of the experiment increased from 3.10 to 3.72; 3.77 mmol/l compared to the control (2.53± 0.029). The content of glycogen in blood, at exposure to the pesticide during 30-120 days decreased and made 8,05±0,27; 7,46±0,088; 9,40±0,13 and 9,33±0,047mg/% accordingly, on 30, 60, 90 and 120 days of the experiment.

The content of lactic and pyruvic acids and glycogen in the intragastricaddition of phyto tea "Antioxidant" is restored and approaches the control group.

At chronic pesticide poisoning in a dose of 27.5 mg/kg the pyruvic acid content in liver tissue was 160.2±1.94; 161.7±9.33; 164.7±6.72; 153.0±8.31 μmol/g on 30, 60, 90 and 120 days of experience, respectively (control 107.6±7.27) (Fig. 4).

The content of lactic acid in liver tissue during all 120 days of exposure to the pesticide was within the range of 3.73±0.091 to 3.71±0.046 mmol/g (control

group 2.64±0.026 mmol/g). The level of glycogen in liver tissue at poisoning by pesticide decreased in all studied terms. At application of antioxidant by poisoned pesticide to animals BAA had a positive effect on metabolites of carbohydrate metabolism and thus the level of lactic, pyruvic acids decreases and the glycogen concentration increases and approaches to a control figure.



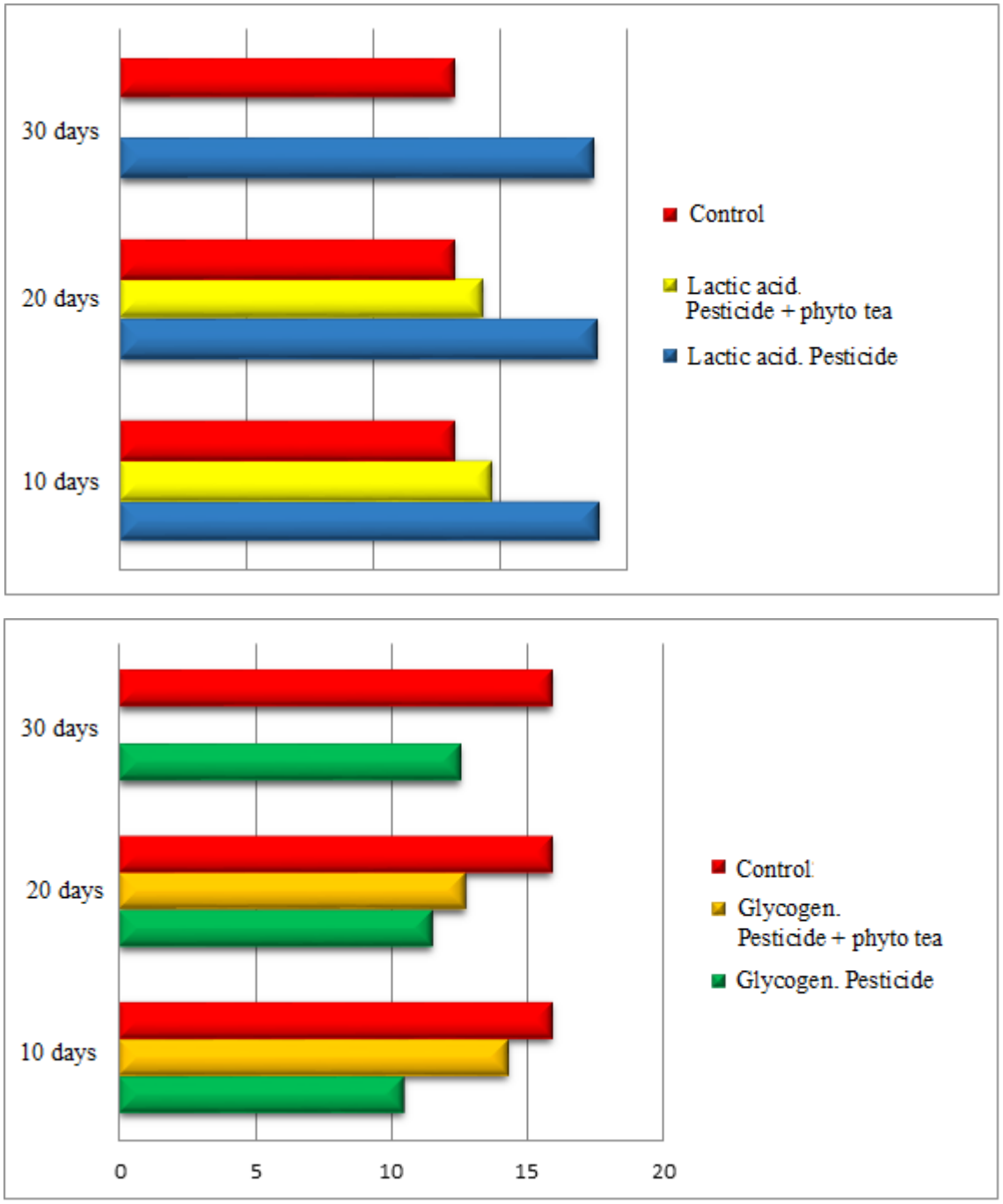


Figure 4: Content of metabolites of carbohydrate metabolism in rats liver under chronic exposure to pesticide and treatment with phyto tea "Antioxidant".

The data obtained show that in case of multiple poisoning with the pesticide there is an increased intensity of anaerobic glycolysis in liver tissue,

which is confirmed by the accumulation of lactic and pyruvic acids and a decrease in glycogen content.

Thus, as a result of the studies carried out, it was established that the positive therapeutic effect was revealed in the indices of metabolites of carbohydrate metabolism with the injection of phyto tea "Antioxidant".

Conclusions:

1. It has been established that in the liver and blood of laboratory animals at exposure to the pesticide, there are observed disorders of carbohydrate - energy metabolism. At the same time, the accumulation of end products of anaerobic glycolysis: pyruvic and lactic acids, reduction of glycogen level was found out.

2. As a means of correcting metabolic processes in the experimental studies carried out it was found that the complex of plant preparation "Antioxidant" consisting of nettle leaves, black currant fruits, rose hips, fruits of mountain ash, green tea in the acute and chronic effects of the pesticide parargyte in the tilting of biochemical processes of carbohydrate energy had a positive effect.

Conflict of interest. All authors state that there is no potential conflict of interest that should be disclosed in this article.

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