

STUDY ON THE EFFECT OF ACTARA AND KONFIDOR ON BIRDS SUBMITTED TO CHRONIC INTOXICATION

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Abstract

Aktara and Konfidor are neonicotinoid products of a new class of insecticides. Their active substances are synthetically obtained organic compounds. The available information on the effect of these insecticides on vertebrates are quite limited. A major source for their toxicity are materials related to their registration as commercial products. Studies were conducted on two experimental groups and one control group of birds. For 45 days in the diet of the birds in group O₁ was added 50mg/kg body weight Konfidor and those of group O₂ - 4,6 mg/kg Aktara. On day 46, blood was taken from all birds by wing vein puncture for biochemical research. It was found that chronic poisoning of the birds with Konfidor and Aktara, reliably led to increased blood glucose, total protein, cholesterol and activities of ASAT and APh. Abnormal behavior of the birds was not observed.

Key words: Neonicotinoid insecticides, chronic intoxication, birds, blood biochemical parameters

INTRODUCTION

The neonicotinoid insecticides are less active in the tissues of vertebrates, unlike the tissues of insects, which determines its lower toxicity in these animals [11].

The same authors [12], also show low tissue toxicity of imidacloprid in the brains of birds and rats. The difficulty of overcoming the blood-brain barrier appears to be another factor that influences the reduction of toxicity of neonicotinoid insecticides in vertebrates [4], [13].

Imidacloprid is toxic to poultry and wild birds. LD₅₀ for Japanese quail is 152mg/kg [6], [9].

The authors found that the birds quickly learned to avoid imidacloprid treated seeds after receiving abdominal discomfort and ataxia when eating those seeds. Based on these studies imidacloprid compound has the potential to be used as a bird repellent for processing seeds [1], [2].

The aim of this study is to test the influence of Aktara 25 and Konfidor on some

biochemical parameters of blood and bird behavior in chronic intoxication.

MATERIAL AND METHOD

The experiment was conducted at the Department of "Animal Sciences" of the Agricultural University, Plovdiv.

The birds were kept outside with enough free space to move. After a 7 day adaptation period we distributed them into three groups of 6 birds each (one male and five female), aligned by live weight.

Throughout the study period, which lasted 45 days, the birds received standard ready mix every morning to which we added 50 mg/kg body weight Aktara for Group O₂ and 4,6 mg/kg Konfidor for Group O₁. On day 46 we took blood from the underwing vein of all birds by puncture. The obtained after centrifuging blood serum we used for testing total protein, glucose, cholesterol, APh, ALAT, ASAT (the tests we used were made by the company "Biomed").

After determining the LD₅₀ (our other publication) the doses for the treatment of birds were calculated. Neonicotinoid insecticides Konfidor and Aktara were mixed well with the experimental bird food, as it

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was pre-diluted with water. The results were processed by using the statistical variation.

RESULTS AND DISCUSSIONS

In Table 1 we present the values of the blood sugar after the chronic treatment of birds with Konfidor and Aktara. It can be seen that its values exceed those of the control group, but not reliably. Similar to our results were obtained by [7] after chronic treatment of chickens with imidacloprid. Single administration of the drug, however, is not characterized by an increase but by a reliable decrease of blood sugar [10].

Increased blood sugar in our opinion is likely to be related to the glycogen breakdown and the following gluconeogenesis which are dictated by the condition of the liver parenchyma. Depending on the extent of its damage we can expect disturbances in some other units of the carbohydrate metabolism.

It is known that the maintenance of cholesterol homeostasis is mainly done by the liver. Therefore, the changes in

cholesterol levels are reciprocal to the degree of exposure to the toxic agents [5]. In our study cholesterol levels had increased almost two times compared to the control group (Table 1).

The plasma concentration of total protein is composed of nearly 100 different proteins, which also depends on the condition of the liver. In our research we found (Table 1) an increase in the concentration of total serum protein in both treatment groups ($p < 0,05$), compared to the control. The increase in group O₂ was bigger.

The effect of the toxic agents on serum transaminases is obvious. While in the healthy individuals their activity remained relatively consistent, in the pathological once there are evidence of damage to the hepatocytes. Our results show a significant and reliable ($p < 0,05$) increase in the activity of ASAT (Table 1) compared to the control group 4567,6(ηmol/s/L) in group O₁ and 4484,2 (ηmol/s/L) in group O₂. Fluctuations in ALAT activity remains at physiological levels in both groups of birds (Table 1).

Table 1 Effect of neonicotinoid insecticides Aktara and Confidor repeatedly applied on the values of the parameters studied in birds

	Groups	Glucose (mmol/L)	Total protein (g/L)	Cholesterol (mmol/L)	ASAT (ηmol/s/L)	ALAT (ηmol/s/L)	Aph (μmol/s/L)
\bar{X}	O ₁	15,55	57,9*	8,47	4567,6*	470,09	2,37*
\bar{X}	O ₂	13,53	68,3*	8,20	4484,2*	555,11	3,35*
\bar{X}	K	8,32	47,6	4,25	1416,9	288,39	1,73
SD	O ₁	0,700	5,069	0,589	340,93	43,44	0,53
SD	O ₂	0,887	4,468	0,778	296,53	45,34	0,19
SD	K	0,671	1,563	0,491	124,74	42,85	0,25
CV %	O ₁	4,501	8,754	6,953	124,42	154,05	0,37
CV %	O ₂	6,555	6,541	9,487	100,17	135,76	0,09
CV %	K	8,064	3,283	11,552	146,75	274,73	0,24

Note: *P<0,05

Some authors [8] found significantly higher values for both enzymes after treating the chickens with imidacloprid. When the liver is damaged the ASAT activity is always higher than that of ALAT (our results demonstrate that). According to [10] the

activity of ASAT increases, while that of ALAT spuriously changes in acute poisoning with imidacloprid. The increased activity of ALAT rarely can be used as an indicator of liver damage (with clear clinical results),

unless these values are at least twice the upper reference values.

We found an increase in the activity of APh (Table 1), more significantly in the second experimental group (O₂) of birds ($p < 0.05$). The increased production and release of APh is also observed in some liver diseases. In experiments with rats [5] also reported an increase in the activity of APh.

Throughout the study period the treated animals did not show a behavior different from the physiological. Some authors [5] do not report any specific behavioral symptoms in chronic treatment with neonicotinoid insecticides also. No changes in general behavior in rabbits after the dermal application of imidacloprid [3].

CONCLUSIONS

The chronic treatment of birds with neonicotinoid insecticides Konfidor and Aktara leads to fairly high blood glucose, ASAT, APh and total protein.

The chronic treatment of birds with Aktara and Konfidor do not lead to changes in their behavior.

Abbreviations:

ASAT aspartateaminotransferase,
ALAT- alanineaminotransferase,
APh, alkaline phosphatase,
LD₅₀- lethal dose 50%

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