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Toxicological Characteristics of Venom of the *Coluber Karelini*

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Abstract The toxicology of snake venom belonging to the Colubridae family has shown that the venom of these snakes contains neurotoxins and hydrolase enzymes. The results of the study in this article suggests that the poisons of *Coluber karelini* species of the Coluber genus has toxicological properties, which is confirmed by the results of the studies.

Keywords Snake, Venom, Coluber karelini, Toxicological properties

1. Introduction

To date, over 1,700 snake species of the Colubridae family have been described, which is approximately 60% of all snake species. About 10 species are found in Uzbekistan. The Colubridae family is of undoubted interest in zootoxicological terms, since it contains species whose poisons, produced by Duvernoy's gland, have a toxic effect [1,2,3].

There have been reports of human poisoning caused by the bites of snakes (Colubridae family), previously considered non-venomous [4,5,6]. African species are considered dangerous in this regard, for example, the boomslang *Dispolides typus*, the tree snake *Thelolarinus kirteanti*, the ground vipers *Attracetaspis* and the tiger snake *Rhabdopes tigrinus*. Their poisonous secret is quite toxic and under certain conditions can cause severe poisoning.

Toxicology and pharmacology of the venoms of Central Asian snakes (*Naja oxiana, Macrovipera lebetina, Echis carinatus multisquamatus*, etc.) are the subject of many works [7,8,9]. The authors describe various aspects of this problem, including the effects of poisons on the body and intracellular processes in various animals. The venoms of snakes of the family Colubridae considered by us in relation to toxicology have been studied relatively poorly. However, there are no specific data in the literature on the toxicological-morphological nature of the action of the venom of snakes of the Colubridae family living in the biogeocenoses of Uzbekistan.

2. Aim of the Research

Our scientific research aim was to give toxicological characteristic for the species of *Coluber karelini* of the Coluber genus (Figure 1).

Figure 1

3. Material and Methods

The toxicity of venoms of snakes of the Colubridae family was determined by us in experiments on mice and rats. Each animal was weighed, and then the appropriate groups were selected from among them. Before the start of the experiment, the poison was diluted in physiological saline, and injected into the animals with a microsyringe intraperitoneally. To calculate LD_{50}, the obtained data were statistically processed according to Litchfield and Wilcoxon [10].

This paper compares the toxic activity of the venoms of the snakes we studied with snakes belonging to the classical poisonous reptiles. In particular, for comparison, we use the literature data summarized in the monograph by Orlov et al. [1].

4. Results and Discussion

We found that the LD_{50} values were 7.21 mg/kg for the multicolored snake, 7.96 mg/kg for the patterned snake, 9.84 mg/kg for the spotted snake (*Elaphe dione Pallas*), and 9.84 mg/kg for the striated snake (*Coluber Tyria Linnaeus*) -10.2 mg/kg, for the four striped snake - 10.64 mg/kg (Figure 2).

It can be seen from the comparison that the toxicity of the venom of the *Naja oxiana* and *Macrovipera lebetina* are significantly higher than that of the snake species studied by

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us, and is close to the toxicity values of the *Echis carinatus multisquamatus* venom. Thus, the difference with cobra venom is 17-20-fold, with *Macrovipera lebetina* venom 3-5-fold, and with *Echis carinatus multisquamatus* venom less than 2 times. These data, however, are definitely the main ones in order to attribute the snakes we studied to the group of poisonous reptiles. For the purpose of a more comprehensive study of the effect of toxic doses of snake venom on the animal organism, we conducted morphological studies of the internal organs of experimental animals. Under the action of the poison of a *Coluber ravergieri*, the main manifestations of intoxication, along with neurotropic effects, can be considered plethora of internal organs, extensive hemorrhages in the area of venom injection. The poison of a multi-colored snake causes tachycardia in experimental animals, which turns into bradycardia, hypoxia is noted, the reaction to various stimuli is slowed down. Animals die with symptoms of paralysis, convulsions and respiratory disorders.

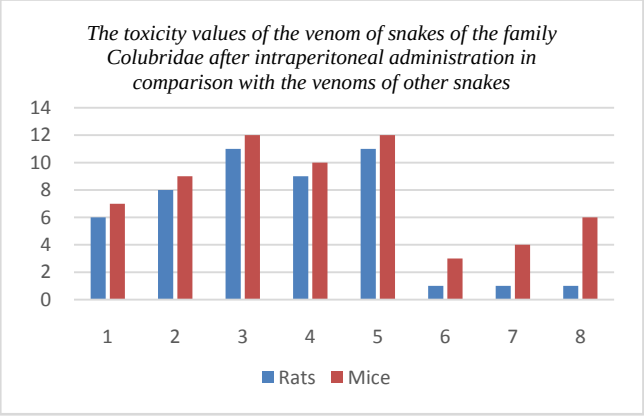

Figure 2

The numbers along the abscissa indicate:
1- Coluber ravergieri.
2- Elaphe dione.
3- Coluber tyria.
4- Coluber karelini.
5- Elaphe quatuorlineata.
6- Naja oxiana
7- Macrovipera lebetina
8- Echis carinatus multisquamatus
The ordinate shows the LD_{50} mg/kg value.

In the last 6 cases, toxicity was determined only in mice. Under the action of the poison of the patterned snake, the main feature of intoxication is a local reaction in the area of the introduction of the poison, vascular plethora and hemorrhage developed in the internal organs.

The venom of the spotted snake causes tachycardia in experimental animals after injection, hypoxia is noted, and the reaction to various stimuli is slowed down. Animals die with symptoms of paralysis, convulsions and respiratory disorders. In case of venom poisoning of striated and four striped snakes, the main feature of intoxication is the manifestation of a neurotoxic effect, which is expressed in excessive excitation of animals after the introduction of poison and their relatively rapid death, as well as in the absence of a local reaction to the poison.

5. Conclusions

Thus, the determination of the toxicity of venoms of snakes of the *Coluber karelini* family showed that it is mainly due to the presence of neurotoxins and hydrolytic enzymes in their composition. The picture of poisoning of warm-blooded animals with the venoms of snakes of the *Coluber karelini* species is largely the same, although there are fundamental differences.

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