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# EVALUATION OF THE ACUTE TOXICITY CHARACTERISTICS AND ACTIVITY OF THE PLANT-DERIVED (ASTUR) OINTMENT IN COMPARISON WITH REFERENCE PREPARATIONS

***Ibragim R. Askarov,***
Andijan State University Professor of the Department of Chemistry, Doctor of Chemistry, Honored Inventor of Uzbekistan, Chairman of the TABOBAT Academy of Uzbekistan
https://orcid.org/0000-0003-1625-0330

***Shoxrux O. Turaxonov***
Andijan State University, Associate Professor of the Department of Natural Compounds and Food Chemistry, Doctor of Philosophy in Chemistry
https://orcid.org/0009-0004-6601-4074
Email: shoxruxturaxonov83@gmail.com

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**Annotation**

In this article, the animals were anesthetized with chloroform and decapitated after applying the plant-based ASTUR ointment to the upper layer of the skin of mammals at a dose of 5000 mg/kg. Morphological and pathological studies were performed to determine the differential efficacy of pathological changes and the effect of the substance on internal organs, and the organs were compared with healthy animals. The physicochemical effects on them, the physiological state of the animal, the reaction of animal cells to the ointment, and their physical condition were studied.

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**Introduction.** Medicinal plants (garlic, onion, ginger, and others) exert positive effects on animal organisms by activating the immune system, enhancing resistance to diseases, and facilitating digestion (anise, dill, ginger, mint). They are beneficial in cases of diarrhea and constipation. As natural remedies against internal and external parasites (wormwood [red basil], Artemisia, garlic, peach leaves, pistachio leaves), they reduce inflammation and relieve pain (chamomile, ginger, rose petals), decrease stress or aggressiveness (valerian, lemon balm, lavender, chamomile), and contribute positively to the healthy growth and development of body organs (alfalfa, licorice, and others) [1–9].

**Materials and Methods:** In the experiments, the acute toxicity of chemical substances was evaluated using the strict “fixed dose” method recommended by the OECD (2002), applied via oral administration and dermal application.

In this test, the plant-derived (ASTUR) ointment was applied stepwise at a strictly fixed dose of 5000 mg/kg to groups of animals of the same sex. Acute toxicity was assessed using preparations containing plant-derived (ASTUR) substances. The experiments were conducted on outbred white laboratory mice, male, with a body weight of 22 ± 2.0 g. Each group consisted of five mice, with a total of ten animals used in the study. Pharmacological experiments were performed on healthy, sexually mature mice that had undergone a quarantine period of 10–14 days.

The experiment was carried out in two stages. In Stage I, the fur was removed from a 2 × 2 cm² area of skin in two mice from the group, and a single dermal application of the ASTUR ointment was administered at a dose of 5000 mg/kg. During observation for 2–3 days, no mortality was recorded. In Stage II, the remaining three animals in the same group were also treated with the ASTUR ointment at a dose of 5000 mg/kg. Simultaneously, animals in the control group received an equivalent amount of petroleum jelly ointment.

On the first day of both stages, the general condition of the experimental animals was monitored hourly, including possible tremors and mortality. For up to two weeks, daily observations were conducted on all groups, assessing general condition, locomotor activity, skin condition and hair coat, respiratory rate and depth, urination, body weight changes, and other parameters. Experimental animals were maintained on a standard diet with unrestricted access to food and water.

At the end of the experiment, the median lethal dose ($LD_{50}$) and toxicity class of the plant-derived (ASTUR) substances were determined [10–13].

The obtained data were statistically processed by calculating the arithmetic mean (M) and the standard error of the mean (m). Differences were considered statistically significant at $p < 0.05$.

**Results and Discussion:**

Five minutes after dermal application of the plant-derived (ASTUR) substance at a dose of 5000 mg/kg, mice exhibited transient symptoms including increased respiratory rate, clustering behavior, and narrowing of the eyes. These effects lasted for approximately 15–20 minutes, after which the animals gradually returned to a normal state. Throughout the entire experiment, no mortality was recorded in animals treated with the ASTUR ointment at a dose of 5000 mg/kg (5/0).

Compared with the control group, animals in the experimental groups did not show a decrease in body weight during the study period (on days 7 and 14) at the administered dose ($p > 0.05$). It was determined that the median lethal dose ($LD_{50}$) of the plant-derived (ASTUR) ointment following a single dermal application at a dose of 5000 mg/kg was greater than 5000 mg/kg. The obtained results are presented in Table 1.

At the conclusion of the study, animals treated with the plant-derived (ASTUR) ointment at a dose of 5000 mg/kg were anesthetized with chloroform and euthanized by decapitation. Morphological and pathological examinations were conducted to assess differential pathological changes and the effects of the substance on internal organs. The obtained results are presented in Table 2.

**Table 1**

Indicators for the evaluation of acute toxicity characteristics of the plant-derived (ASTUR) substances in male mice (M ± m, n = 5)

| Groups | Dose (mg/kg, mL) | Total number of animals / number of dead animals | Average body weight of animals (g) (Day 1) | Average body weight of animals (g) (Day 7) | Average body weight of animals (g) (Day 14) | $LD_{50}$ |
|---|---|---|---|---|---|---|
| Control | 0,5 ml | 5/0 | 22,0 ± 0,3 | 22,8 ± 0,4 | 23,0± 0,4 | - |
| ASTUR | 5000 mg/kg | 5/0 | 22,1± 0,2 | 22,6± 0,3 | 22,9 ± 0,4 | >5000 mg/kg |

**Table 2**

Results of morphological and pathological examinations following administration of the plant-derived (ASTUR) substances to animals at a dose of 5000 mg/kg (M ± m, n = 5)

| | Control | ASTUR |
|---|---|---|
| Body weight | 23,0± 0,4 | 22,9 ± 0,4 |
| Liver | 1401,8 ± 31,5 | 1408,5 ± 30,6 |
| Lungs | 222,5 ± 11,3 | 222,6 ± 10,2 |
| Heart | 185,4 ± 7,2 | 184,3 ± 6,5 |
| Kidneys | 204,0 ± 8,0 | 201,5 ± 7,4 |
| Thymus | 21,2 ± 0,5 | 21,3 ± 0,4 |
| Lymph nodes | 11,7 ± 0,3 | 11,5 ± 0,4 |
| Spleen | 269,7 ± 8,4 | 268,8 ± 8,1 |

Note: $p < 0.05$ compared with healthy animals

**Conclusion.** When the plant-derived (ASTUR) ointment was applied once dermally to mice at a dose of 5000 mg/kg (relative to the ointment mass), and the obtained results were classified according to OECD guidelines, the sample was determined to belong to Class VI – practically non-toxic chemical substances, with an $LD_{50} > 5000$ mg/kg.

At the end of the study, animals treated with the plant-derived (ASTUR) substance at a dose of 5000 mg/kg were anesthetized with chloroform and euthanized by decapitation. Morphological and pathological examinations were conducted to assess differential pathological changes and the effects of the substance on internal organs. When compared with healthy animals, no statistically significant differences were identified between the examined organs.

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