Journal of Chemistry of Goods and Traditional Medicine

J Chem Good Trad Med, Volume 3, Issue 6, 2024 Traditional Medicine

ASSESSMENT OF THE ACUTE TOXICITY PROPERTIES OF THE FOOD ADDITIVE "ASTIM"

Ikboljon M. Tulkinov
Andijan State Technical Institute, Teacher of the Department of Civil Engineering
https://orcid.org/0009-0000-2365-9383
E-mail: iqboljontolqinov4@gmail.com

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

DOI: https://doi.org/10.55475/jcgtm/vol3.iss6.2024.403

Keywords:
Sea bucthorn, utrica, toxicity, food additive

Annotation
This article discusses the research conducted to assess the acute toxicity properties of the "ASTIM" food supplement, which is composed of medicinal plant components. According to the research results, no fatalities were observed during the trials conducted at a dose of 2000 mg/kg, indicating its safety. Based on OECD standards, the"ASTIM" food supplement is classified as a non-toxic substance and belongs to class V (LD_{50} > 2000 mg/kg). This confirms its safety and lack of adverse effects on the body. The results obtained indicate that the "ASTIM" food supplement can be recommended as a new, safe, and effective treatment for gastrointestinal inflammatory diseases.

How to Cite
Tulkinov, I. M., & Askarov, I. R. ASSESSMENT OF THE ACUTE TOXICITY PROPERTIES OF THE FOOD ADDITIVE "ASTIM". Journal of Chemistry of Goods and Traditional Medicine, 3(6). https://doi.org/10.55475/jcgtm/vol3.iss6.2024.403

Introduction. It is well known that the demand for natural compounds derived from plants is steadily increasing. Food supplements made from substances extracted from natural compounds differ from synthetic drugs due to their low toxicity, compatibility with living organisms, and specific activity. Today, the study of natural compounds with high biological activity and the development of food supplements based on them is one of the pressing tasks.

The food supplement "ASTIM" , developed from medicinal plant components, consists of the fruits of the sea buckthorn plant and the aerial parts of the nettle plant. The antioxidant activity of this food supplement was determined by the method of inhibiting the autoxidation reaction of adrenaline under in vitro conditions. As a result of the studies, it was found that all samples in ratios of 1:1, 1:2, and 1:3 showed antioxidant activity above 10%, indicating the presence of antioxidant effects. The highest antioxidant activity—45%—was observed at the 1:1 ratio, which was selected as the optimal one for further experiments.

The elemental composition of the "ASTIM" food supplement was studied using inductively coupled plasma optical emission spectrometry (ICP-OES), which revealed the presence of 61 elements. Among the macroelements, phosphorus, potassium, and calcium were found in the highest amounts. Among the microelements, iron, aluminum, manganese, and zinc were present in greater

quantities compared to other elements. The content of toxic elements is presented in the following table.

Table 1

Name of element	Amount in 100 g sample, µg
Arsenic As	65,37
Lead Pb	126,25
Antimony Sb	39,00
Uranium U	749,46

The research results show that the content of toxic elements is extremely low. Based on scientifically substantiated analytical data, it has been established that the food supplement possesses significant medicinal properties due to its high content of macro- and microelements.

The active compounds in these medicinal plants (vitamins, flavonoids, nutrients, sugars, amino acids, proteins) are essential factors in activating biochemical processes in the body, normalizing metabolic processes, metabolism, and the functions of vital organs and systems.

Experimental Section:

The experiments applied the acute toxicity test for chemical substances administered orally in a strictly defined dose, as recommended by the OECD (Organization for Economic Co-operation and Development, 2002).

In this test, a group of same-sex animals was given a fixed dose of 2000 mg/kg in stages. The acute toxicity was evaluated to determine any toxic effects of the “ASTIM” food supplement. The experiments were conducted on non-bred white laboratory mice of the same sex, weighing 21±1.8 g. Each group consisted of 5 mice. Pharmacological tests were carried out on healthy, sexually mature mice that had undergone a 10–14 day quarantine period.

The experiment was conducted in two stages:
In the **first stage**, two mice from the group were given a single oral dose of 2000 mg/kg of the “ASTIM” food supplement in a volume of 0.4 ml using a special probe. The mice were observed for 2–3 days, and no fatalities were recorded.

In the **second stage**, the remaining three mice from the same group were also given 2000 mg/kg. At the same time, the control group mice were given an equal volume of distilled water.

On the first day of both stages, the general condition of the animals was monitored hourly, and any potential convulsions or deaths were recorded. For up to two weeks, daily observations were made regarding the general condition of all animals, their motor activity, skin and fur condition, respiratory rate and depth, urination, changes in body weight, and other parameters. The animals were kept in standard conditions with unrestricted access to food and water.

At the end of the experiment, the average lethal dose (LD_{50}) and the toxicity class of the “ASTIM” food supplement extract were determined.

The obtained data were statistically processed using the arithmetic mean (M) and standard error of the mean (m). Differences with a significance level of $\pi<0.05$ were considered statistically significant.

Discussion of the Results:

Ten minutes after administration of the “ASTIM” food supplement at a dose of 2000 mg/kg, the animals exhibited increased respiratory rate, clustering in one place, and narrowing of the eyes. These effects lasted for 12–18 minutes, after which the mice began returning to normal. Throughout the experiment, no deaths were observed in any of the groups that received the “ASTIM” food supplement at a dose of 2000 mg/kg (5/0).

When comparing the experimental groups with the control group, it was found that the administered dose did not cause any decrease in body weight of the mice throughout the experiment (on days 7 and 14) ($\pi>0.05$).

It was determined that the median lethal dose (LD_{50}) of the «ASTIM" food supplement with a single oral administration of 2000 mg/kg exceeds 2000 mg/kg, indicating its low toxicity. The results are presented in Table 2.

Indicators for Assessing the Acute Toxicity of the "ASTIM" Food Supplement in Mice (M±m, n=5)

Groups	Dose, mg/kg, ml	Animals in group / Number of deceased animals	Average body weight of animals, g			LD_{50}, mg/kg
			1 day	7 day	14 day	
Control	0,5 ml dis. water	5/0	20,0± 0,3	21,8 ± 0,3	22,6± 0,35	-
Food supplement «ASTIM"	2000 mg/kg	5/0	19,7 ± 0,2	20,4 ± 0,25	21,8± 0,3	>2000 mg/kg

***Note – π<0.05 compared to the control group**

Toxicity is the property of a substance whereby, when it enters the body of a human, animal, or plant in a certain amount, it can cause poisoning or death.

Acute toxicity refers to the toxic effect of a substance after a single or multiple exposures within no more than 24 hours, which may manifest as disruption of physiological functions or morphological changes in the organs of experimental animals.

According to the OECD classification, based on the results of a single administration of the "ASTIM" food supplement to mice at a dose of 2000 mg/kg, it was determined that this supplement belongs to Class V substances — practically non-toxic (LD_{50} > 2000 mg/kg).

Conclusions: A new food supplement, **"ASTIM"** , made from sea buckthorn and nettle plants, is proposed for use in the treatment of inflammatory gastrointestinal diseases, due to its high content of macro- and microelements, vitamins, and flavonoids.

References

1. Asqarov I.R. Sirli tabobat// T: Fan va texnlogiyalar nashriyot-matbaa uyi. Toshkent. 2021-y. –B. 1010

2. Asqarov I.R. Tabobat qomusi// T.: Mumtoz so`z. Toshkent. 2019-y. –B. 1590

3. Xalikov B.M., Ergashev B.D., Po`latov S.M, Chakanda va uning foydali xususiyatlari, Yosh mutaxassislar ilmiy – amaliy jurnali, 2023-yil, 5-son

4. Asqarov I.R., To'lqinov I.M. Chakanda o'simligining kimyoviy tarkibi va xalq tabobatida qo'llanilishi // Xalq tabobati plus, №1(18), 2024 yil

5. Asqarov I.R., To'lqinov I.M. Chakanda va Gazanda o'simligining vitaminlar miqdorini o'rganish// Xalq tabobati plus, №2(19), 2024 yil

6. OECD (2001) Guideline for testing of chemicals. Acute Oral Toxicity – Fixed Dose Procedure No 420 РуководящийдокументОЭСР Test № 420 «Acute Oral Toxicity - Fixed Dose Procedure».

7. Миронова.А.Н Руководство по проведению доклинических исследований лекарственных средств. Часть первая / Под ред. М.: Гриф и К, 2012. – 944 с.