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Study of Acute Toxicity Dietary Supplement" Boostdiab"

Abdizhalilova Zilola Khikmatullaevna 1 ,
Ergasheva Dilafruz Zaripovna 2,
Isamova Marguba Ziyatovna3
1 Associate Professor, Institute of Pharmaceutical
Education and Research, Training and Retraining Center
2 Assistant Institute of Pharmaceutical Education and Research
3Senior Lecturer, Institute of Pharmaceutical Education and Research,
Training and Retraining Center

Abstract

Diabetes mellitus is one of the most pressing global medical and social problems. Currently, approximately 7 percent of the world's population suffers from this disease. The vast majority of these people have type 2 diabetes. Experts conclude that an unhealthy lifestyle is the main factor causing this condition.This article presents the results of an acute toxicity study of the dietary supplement "Bustdiab," conducted on albino mice in accordance with guidelines for the toxicological evaluation of dietary supplements. It was found that a single oral administration of the drug at doses up to 2500 mg/kg does not cause toxic effects or death in animals. The median lethal dose (LD50) exceeds 2500 mg/kg, corresponding to hazard class 5 (low-hazard substances).

Keywords: Diabetes mellitus, dietary supplement, experiment , acute toxicity, lethal dose.

Introduction

Currently, diabetes is one of the most acute global medical and social problems. According to the World Health Organization, the prevalence of the disease is steadily increasing, and a significant proportion of patients suffer from type 2 diabetes. The development and study of new dietary supplements based on medicinal plants is considered a promising area in the search for safe means for the prevention and comprehensive treatment of diabetes. Therefore, toxicological evaluation of the drugs being developed is an important step.[1;2;3;7,18]

Currently, approximately 7 percent of the world's population suffers from this disease. The vast majority of these people have type 2 diabetes. Experts conclude that an unhealthy lifestyle is the main factor causing this condition. Since the COVID-19 pandemic, the number of people with diabetes has increased in our country **.** Experts note that the number of people suffering from this disease has increased since the COVID-19 pandemic, and diabetes in general is one of the complications of COVID-19. Research is being conducted worldwide to conduct

pharmacotoxicological studies of drugs with various effects on metabolic processes for the treatment of diabetes and its complications, as well as to determine their mechanisms of action. Therefore, it is necessary to evaluate the hypoglycemic activity of drugs and dietary supplements (DS) derived from local medicinal plants, study their preclinical pharmacotoxicological properties, and determine their acute toxicity. In our republic, special attention is being paid to expanding the range of medications and dietary supplements developed using local medicinal plant materials, proving their biological efficacy and safety, and certain scientific results are being achieved in this area. Currently, the World Health Organization has declared diabetes a 21st century epidemic. The increasing prevalence of diabetes is leading to the emergence of global medical and social problems. [2;5;9,17,19]

In recent years, the need for herbal remedies with multifunctional beneficial effects and no adverse effects has increased in the treatment of this disease. Therefore, identifying and developing antidiabetic drugs from biologically active substances derived from local plants is a pressing issue. Today, the physiological and molecular mechanisms underlying the development of diabetes and its adverse effects are being studied in depth worldwide. Particular attention is being paid to identifying safe herbal remedies with diabetes prevention and correction properties. Phytoecdysteroids, with their anabolic, stress-protective, antioxidant, antiradical, bactericidal, immunomodulatory, adaptogenic, and hypoglycemic properties, are of particular interest. To correct the histostructural and hydrolytic activity disorders of the pancreas and other digestive organs associated with diabetes, it is necessary to develop new, effective approaches based on an in-depth study of the effects of multifunctional phytoecdysteroids on pancreatic endocrine secretion. The development of effective, environmentally friendly methods for the prevention and treatment of diabetes is one of the most pressing issues in modern diabetology. Currently, our country is implementing large-scale measures aimed at providing the population with affordable, high-quality medications and import-substituting pharmacological agents derived from local raw materials for the prevention and treatment of diabetes. Diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin or when the body is unable to effectively utilize the insulin it produces. This leads to high blood glucose levels. Currently, synthetic medications are most often used to treat diabetes. However, synthetic medications have numerous side effects. Therefore, the development of dietary supplements based on medicinal plants for the prevention and comprehensive treatment of diabetes is one of the most pressing issues. [4; 5; 6; 11]

The difference between dietary supplements and medications is that medications have a specific chemical formula, while dietary supplements are a mixture of biologically active substances. Another difference between medications and dietary supplements is that the composition of medications is always standardized, and the exact dosage of dietary supplements is always specified in the instructions [7 ;13;15,16].

The purpose of the research: To evaluate the acute toxicity of the biologically active food supplement " Bustdiab " when administered orally to white mice.

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Materials and Methods

Acute toxicity was studied in accordance with the Methodological Guide for Conducting Toxicological Studies of Food and Biologically Active Food Additives in Animal Experiments (Tashkent – 2016).

Number and sex of animals: For the experiment, 12 white outbred mice, males and females, weighing 19–21 g, were used, kept in quarantine for 14 days.

Results and Discussion

Administration of doses of the substance: One of the fixed doses was chosen as the initial dose: 500 mg/kg White mice were given a single oral administration of a 10% aqueous solution of the dietary supplement " Bustdiab " in the following doses :

1 group (3 mice) – per os at a dose of 500 mg/kg (0.1 ml);
Group 2 (3 mice) – per os at a dose of 1000 mg/kg (0.2 ml);
Group 3 (3 mice) – per os at a dose of 1500 mg/kg (0.3 ml);
Group 4 (3 mice) - per os at a dose of 2000 mg/kg (0.4 ml);
Group 5 (3 mice) - per os at a dose of 2500 mg/kg (0.5 ml).

Observation: During the first 24 hours of the experiment, the animals were observed hourly in a laboratory setting. Changes in skin and fur, eyes and mucous membranes, respiratory, circulatory, autonomic, and central nervous systems were recorded, as well as somatomotor activity and behavior, possible seizures (tremors), convulsions, salivation, diarrhea, lethargy, drowsiness, coma, and death. Then, for two weeks, the animals of all groups were observed daily in a vivarium for their general condition and activity, behavioral characteristics, response to tactile, pain, sound, and light stimuli, respiratory rate and depth, heart rate, hair and skin condition, tail position, fecal quantity and consistency, urination frequency, weight changes, and other indicators. All experimental animals were kept in the same conditions and on a common diet with free access to water and food.

At the end of the experiment, the toxicity class was determined.

When studying the acute toxicity of the dietary supplement " Bustdiab ", the following data were obtained: after the administration of the dietary supplement in the studied doses during the day, the mice remained active, no visible changes in behavior or functional state were observed (Table 1).

Table No. 1 Determination of acute toxicity of dietary supplement (LD $_{50}$) " Bustdiab ", when administered orally to white mice

No. groups	Dosage of dietary supplements		Path introduction	result
	mg/kg	ml		
1	500	0.1	per os	0/3
2	1000	0.2	per os	0/3
3	1500	0.3	per os	0/3
4	2000	0.4	per os	0/3
5	2500	0.5	per os	0/3
LD $_{50}$	> 2500 mg/kg			

The condition of the fur and skin was normal and unchanged. No mice refused food or water, and no deaths were observed. On the second day and during the subsequent observation period, no pathological changes in the behavior or physiological parameters of the mice were observed. Water and food consumption were normal, and no delays in growth or development were observed. No deaths were observed within 14 days. LD_{50} of the dietary supplement " Bustdiab " amounted to a dose of >2500 mg/kg

According to the toxicity classification of substances of the dietary supplement " Bustdiab " belongs to toxicity class 5.

Discussion. The data obtained indicate low toxicity of the studied dietary supplement after a single oral administration. According to the generally accepted toxicity classification, the drug can be classified as a low-hazard substance. These results confirm the potential toxicological safety of the dietary supplement " Bustdiab " when used as recommended.

Conclusions:

1. A single oral administration of the dietary supplement " Bustdiab " in doses up to 2500 mg/kg does not cause death or clinical and physiological disturbances in laboratory mice.
2. LD50 of the drug exceeds 2500 mg/kg.
3. According to the toxicity classification, the dietary supplement " Bustdiab " belongs to hazard class 5 - low-hazard substances.
4. The dietary supplement " Bustdiab " exhibits low toxicity when administered orally at the doses studied. The dietary supplement can be classified as a low-hazard substance (hazard class 5), indicating its toxicological safety when used at the recommended doses.

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