



STUDY OF ACUTE TOXICITY OF MULTIVIT BALM

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ABSTRACT

This article is devoted to the study of acute toxicity of a multivitamin balm of a complex composition based on local medicinal plant materials: Calendula flowers (Flores Calendulae); Rose hips (Fructus Rosae); Black currant leaves and fruits (Folia et Fructus Ribis nigri); Cabbage leaves (Folia Brassicae oleraceae); Carrot root (Radix Dauci sativi); Rowan berries (Fructus Sorbi); Sea buckthorn fruits and oil (Fructus et Oleum Hippophaës); Pumpkin seeds (Semen Cucurbitae); Stinging nettle leaves (Folia Urticae dioicae); sugar syrup (Sirupus saccharinus), ethyl alcohol (Spiritus aethylicus), color and purified water (Aqua purificata).

A complex of natural vitamins, flavonoids, organic acids, carotenoids and microelements helps normalize metabolic processes, increase the body's resistance to stress factors, and improve the functions of the immune, cardiovascular and digestive systems.

Pharmacological action of the components:

- Rose hips (*Fructus Rosae (Rosa canina L.)*) are rich in ascorbic acid, carotenoids, and flavonoids. They exhibit pronounced antioxidant and capillary-strengthening

properties, stimulate the immune system, accelerate tissue regeneration, and promote the elimination of toxins.

- Blackcurrant leaves and fruits - *Folia et Fructus Ribis nigri (Ribes nigrum L.)* contain anthocyanins, tannins and vitamins C and P. They have anti-inflammatory, diaphoretic and antioxidant effects, strengthen the vascular wall, and promote recovery from infectious diseases.

- Cabbage leaves - *Folia Brassicae oleraceae (Brassica oleracea L.)* A source of vitamins C, K and U. They improve



digestion, promote healing of mucous membranes, and have an anti-sclerotic and metabolic regulating effect.

- The root of the common carrot— *Radix Dauci sativi* (*Daucus sativus Hoffm.*)— contains β -carotene, B vitamins, pectin, and trace elements. It stimulates metabolism, increases the body's antioxidant defenses, and improves skin and vision.
- Rowan berries (*Fructus Sorbi*, *Sorbus aucuparia* L.) are rich in organic acids, anthocyanins, and vitamins. They have choleric, diuretic, and vascular strengthening properties, promoting detoxification and improving overall body tone.
- Sea buckthorn fruit and oil— *Fructus et Oleum Hippophaës* (*Hippophae rhamnoides* L.) —contain carotenoids, tocopherols, flavonoids, and unsaturated fatty acids. They exhibit pronounced antioxidant, wound-healing, and regenerative properties, improving lipid metabolism and skin condition.
- Flowers of Common marigold — *Flores Calendulae* (*Calendula officinalis* L.) have anti-inflammatory, antiseptic, and antispasmodic properties. They improve microcirculation, accelerate tissue healing, and have a mild choleric effect.
- Pumpkin seeds (*Semen Cucurbitae* L.) contain zinc, phytosterols, and tocopherols. They exhibit mild diuretic and hepatoprotective properties and help normalize prostate function and digestion.
- Stinging nettle leaves (*Folia Urticae dioicae* (*Urtica dioica* L.)) are a source of chlorophyll, vitamins C and K, iron, and calcium. They stimulate hematopoiesis, increase hemoglobin levels, and have a tonic and restorative effect.

Purpose of the study. The combined action of the herbal preparation's

components provides a synergistic effect aimed at enhancing the body's adaptive capacity, improving metabolism, strengthening the immune system, and slowing the processes of premature aging. The preparation helps increase vitality, accelerate recovery from illnesses, and reduce the effects of stress.

Conducting bioequivalence studies: acute toxicity and specific activity of the drug "Multivit" phytobalm.

Experimental part. Materials and methods.

Object of study: Composition per 100 ml: *Active ingredients* : Calendula flowers (*Flores Calendulae*); Rose hips (*Fructus Rosae*); Blackcurrant leaves and fruits (*Folia et Fructus Ribis nigri*); Cabbage leaves (*Folia Brassicae oleraceae*); Carrot root (*Radix Dauci sativi*); Rowan berries (*Fructus Sorbi*); Sea buckthorn fruits and oil (*Fructus et Oleum Hippophaës*); Pumpkin seeds (*Semen Cucurbitae*); Nettle leaves (*Folia Urticae dioicae*) . *Excipients*: sugar syrup (*Sirupus saccharinus*), ethyl alcohol (*Spiritus aethylicus*), color and purified water (*Aqua purificata*).

Pharmacotherapeutic group: Herbal tonic and restorative agent with adaptogenic and immunomodulatory properties.

Pharmacological properties: This herbal preparation is a multi-component herbal remedy with general tonic, adaptogenic, antioxidant, anti-inflammatory, and metabolic activating effects. Its pharmacological activity is due to the combined and complementary effects of the biologically active substances contained in the medicinal plant material.

Indications for use: Phytobalm is recommended as a general tonic, tonic and adaptogenic remedy. in conditions



accompanied by a decrease in physical and mental performance, increased fatigue and weakening of the body's defenses. It is used to increase the body's non-specific resistance to adverse environmental factors, including stress, fatigue, nutritional imbalances and hypovitaminosis.

Recommended as part of complex therapy and for prevention in the following conditions:

- during the period of convalescence after infectious and inflammatory diseases;
- in cases of chronic stress, emotional and physical overstrain;
- for chronic fatigue syndromes and asthenic conditions of various origins;
- in case of weakened immunity, frequent colds and viral diseases;
- as an additional source of natural antioxidants, vitamins and microelements;
- in case of metabolic disorders, loss of appetite and general exhaustion;
- to improve overall well-being and normalize sleep in case of functional disorders of the nervous system.

Phytobalm can be used as an auxiliary means to support the adaptive capacity of the body in people exposed to intense physical and psycho-emotional stress (athletes, students, people engaged in mental work, the elderly).

Directions for use and dosage:

Take this herbal remedy orally, 20–30 minutes before meals. Shake well before use.

Dosage regimen:

- Adults: 1 teaspoon (5 ml) 2-3 times a day, with a small amount of water or added to tea, juice or mineral water.

- For adolescents over 12 years of age: ½ teaspoon (2.5 ml) 2 times a day.
- The course of treatment lasts from 3 to 4 weeks. If necessary, the course can be repeated after a break of 2 to 3 weeks.

For preventative purposes, the drug can be used in courses during the autumn-winter and spring periods to strengthen the immune system and replenish vitamin deficiencies.

In complex therapy of chronic diseases, the dosage and duration of use are determined by the doctor individually, depending on the patient's condition and the purpose of therapy.

Release form: The herbal preparation is available in the form of a liquid balm for oral administration - a thick brown liquid with a characteristic aroma of plant materials.

The acute toxicity of the compared drugs was studied in 12 white mice weighing 19–22 g. The animals were divided into two groups of six animals each. The mice were housed in standard plastic cages on sawdust bedding. The cages were located in a separate room. The air temperature was maintained between 20–25°C, and the relative humidity was 40–70%. Temperature and humidity were recorded daily. Access to water and food was free. All animals participating in the experiment were healthy, without any physiological abnormalities.

Before the experiment began, two required doses of the drug were selected. The chosen doses were 20 ml/kg and 25 ml/kg. These doses were determined based on previously recorded acute enteral toxicity levels for similar drugs, taking into account the expected pharmacokinetics and safety margins. Immediately before the



study began, the required volume of drug was withdrawn from the vials and dispensed into 1 ml syringes for subsequent administration to the animals.

On the day of the experiment, mice were left without food until the drug was administered.

Solution from a bottle Multivit phytobalm was used as follows:

- the first group of 6 mice was administered a dose of 20 ml/kg intragastrically;
- the second group - 25 ml/kg intragastrically.

Results: Following intragastric administration of the drugs, the mice were observed. During the first hours of the experiment, some animals exhibited mild lethargy and decreased motor activity; no seizures or significant neurological impairment were observed. No lethal outcomes were observed when the syrup was administered at a dose of 20 ml/kg . Similar results were obtained with a dose of

25 ml/kg —no animal deaths were observed.

During the two-week observation period, no significant changes in weight or signs of significant toxicity were observed in the surviving animals . Behavioral analysis revealed that the surviving mice showed no significant differences in activity between the groups , indicating a similar toxicity profile for the study drugs.

The study showed that Multivit Phytobalsam, administered intragastrically to white mice at doses of 20 and 25 ml/kg, did not cause death. Therefore, the median lethal dose (LD_{50}) exceeds 25 ml/kg. The results of the study showed that the phytobalm "Multivit" When administered intragastrically to white mice at doses of 20 and 25 ml/kg, the phytobalm did not cause death or any signs of significant toxicity . The experimental results are presented in Table 1.

Table 1

Determination of acute toxicity of the drug "Multivit" phytobalm

No. living	Multivit phytobalm							
	Weight, g	Dose	Path introduction	Result	Weight, g	Dose	Path introduction	Result
		ml/kg				ml/kg		
1	19	20 ml/kg	in/f	There is no death	20	25 ml/kg	in/f	There is no death
2	20			There is no death	19			There is no death
3	21			There is no death	21			There is no death
4	22			There is no death	20			There is no death
5	20			There is no death	19			There is no death
6	22			There is no death	21			There is no death
				There is no death				There is no death
				There is no death				There is no death
				There is no death				There is no death
LD ₅₀	> 25 ml/kg							

Conclusion:



According to the generally accepted toxicity classification (Hodge & Sterner), the drug under study is classified as virtually non-toxic. The data obtained indicate a high degree of safety for Multivit. phytobalm for oral administration.

Following administration, only brief manifestations of mild lethargy and decreased activity were observed, which resolved spontaneously within a few hours. During the 14-day observation period, no

changes in the animals' general condition, body weight, or behavior were observed.

The median lethal dose (LD_{50}) exceeds 25 ml/kg, which allows the drug to be classified as a practically non-toxic substance according to the Hodge & Sterner classification.

Thus, the phytobalm "Multivit" has a high level of safety when administered orally and can be recommended for further preclinical studies of toxicity and pharmacological activity.

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