

Study of the Acute Toxic Effects of the Extract of the Shield-Bearing Hare's-Foot

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Abstract: In the family Lamiaceae, the genus *Lagochilus* is widely represented, especially in Uzbekistan, where more than 18 species grow. One of the representatives of this genus, *Lagochilus setulosus*, is a perennial plant with woody stems at the base. The stems are thin, straight, initially bare or bristly, later acquiring a shiny white hue and reaching a height of 30 to 80 cm. The leaves of the plant are diamond-shaped and broadly ovate, deeply incised or lobed, with short lobes that have no pointed tips. The leaves are bare on long, narrow winged petioles, with the petioles of the middle and upper leaves being shorter. The flowers of this plant are sessile, grouped in clusters of 4-6 in the axils of the upper leaves. The bracts are represented by thin, needle-like structures. The flower cup is narrowly bell-shaped with narrow triangular spiny teeth. The flower corolla is white with brown spots, measuring 2.3 to 3cm in length. The plant flowers from May to September [1]. Various groups of biologically active compounds have been identified in *Lagochilus*.

Key points: extraction, diterpenoids, alkaloids, toxicity, expectorant, anti-inflammatory, tonic.

The study of the acute toxic effects of the extract of the shield-bearing hare's-foot, often referred to in scientific contexts by its Latin name *Bacopa monnieri* or similar names, typically focuses on assessing the safety and potential toxicity of plant extracts. Here's some general information on what such a study might cover:

Extract Preparation:

Details on how the extraction is done (e.g., using solvents like ethanol or water).

Concentration levels of the extract used in tests.

Methods of Toxicity Assessment:

Laboratory animals (e.g., mice, rats) often used for in vivo studies.

Assessment through oral administration or injection.

Monitoring for clinical signs of toxicity such as lethargy, changes in behavior, or physiological symptoms.

Histopathological Analysis:

Examination of tissues (liver, kidneys, etc.) under a microscope for any cellular damage or changes.

Biochemical Parameters:

Analysis of blood samples for markers of liver and kidney function (e.g., ALT, AST, creatinine levels).

Dosage:

Determination of the lethal dose (LD50) to understand the acute toxicity levels.

Results Interpretation:

Discussion of whether the extract shows significant toxicity.

Comparison with established safety levels and other similar plant extracts.

Potential Outcomes Safety Profile: Findings may reveal if the extract is safe or poses a risk at certain doses.

Therapeutic Potential: If toxic effects are minimal, further studies may explore potential therapeutic uses, such as anti-inflammatory or cognitive benefits.

Recommendations: Suggestions for safe usage in traditional or medical applications.

Such studies are crucial for understanding the safety and efficacy of natural products, guiding both herbal medicine users and regulatory bodies. It's essential for researchers to ensure thorough testing to avoid harmful effects when using plant extracts.

The aboveground parts of the plant *L. setulosus* contain a variety of compounds, including diterpenoids, alkaloids, tannins, vitamins, flavonoids, carbohydrates, and organic acids [2]. In traditional medicine, *L. setulosus* is used as a remedy with expectorant, anti-inflammatory, tonic, antispasmodic, hemostatic, and sedative effects. Experimental studies have shown that an infusion of this plant causes an increase in heart rate [3].

Aim: To study the acute toxic properties of the butanol extract from *L.setulosus* plants.

Materials and Methods: *L. setulosus* was collected during flowering in 2024 in Tashkent. The species was identified by Ph.D. Nigmatullaev O.M. at the Laboratory of Medicinal and Technical Plants of the Institute of Chemistry of Plant Substances named after Academician S.Yu. Yunusov, Academy of Sciences of Uzbekistan (herbarium number 50.236431).

Extraction and Isolation: The air-dried aboveground part of the plant (1 kg) was ground and extracted with methanol at room temperature. After vacuum evaporation, an unpurified extract weighing 445 g was obtained. This extract was suspended in 5 liters of water (H₂O) and then subjected to sequential fractionation with chloroform, ethyl acetate, and n-butanol.

The evaluation of the acute toxicity of the butanol extract from *L.setulosus* was conducted on laboratory white non-pedigree mice, which were kept under standard vivarium conditions. The experiments were carried out in accordance with the rules established by the "International Convention for the Protection of Vertebrate Animals Used for Experimental and Scientific Purposes" (Strasbourg, 1986), with adherence to the International Recommendations of the European Convention for the Protection of Vertebrate Animals used in Experimental Research [4].

Results and Discussion: The study of the acute toxicity parameters of the butanol extract from *L. setulosus* was conducted on male white non-pedigree mice weighing 19–21 grams. The substance was administered orally. The extracts of *L. setulosus* were given using a non-invasive metal probe at doses of 500-1000-3000-8000-10000-12000 mg/kg in the form of a 20% aqueous solution. Each dose was tested on 6 mice. After the single administration of the drug, the condition of the experimental animals was monitored for 14 days. The average lethal dose was determined using the Litchfield and Wilcoxon method [5].

After the administration of the extract from *L. setulosus* at doses up to 8000 mg/kg, the animals exhibited increased motor activity and an elevated heart rate.

When the extract was administered at a dose of 8000 mg/kg, there was observed suppression of the overall condition, limited motor activity, shallow breathing, and reduced reactions to external stimuli.

At a dose of 10,000 mg/kg of the *L. setulosus* extract, a deterioration in the overall condition, tremors, and the death of one out of six animals occurred after 64 minutes. At a dose of 10,600 mg/kg of the *L. setulosus* extract, a 50% mortality rate was observed in the animals.

The average lethal dose for the oral administration of the *L. setulosus* plant extract is: LD₅₀ 10,600 (9,217-12,190) mg/kg.

Conclusion: According to GOST 12.1.007-76, the *L. setulosus* extract is classified as a low-hazard substance (Class III) for acute toxicity when administered intragastrically, and according to A.V. Stefanov's classification, it is categorized as practically non-toxic (Class V) [6].

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