

Study of anti-inflammatory and analgesic activity  
compass lettuce herb (*Lactuca serriola* L.)

E. B. Artyushkova, M.P. Gladchenko, T.V. Korableva, R.A. Bubenchikov  
FSBEI HE "Kursk State Medical University" of the Ministry of Health of Russia (Kursk)

Study of the anti-inflammatory and analgetic activity of the herb of *Lactuca serriola* L.

EB Artyushkova, MP Gladchenko, TV Korablyova, RA Bubenchikov  
Kursk State Medical University (Kursk, Russia)

SUMMARY

The article presents the results of a study of acute toxicity, anti-inflammatory and analgesic activity of compass lettuce herb. It was found that a single infusion of the infusion in doses from 1 g / kg to 5 g / kg made it possible to classify it as practically non-toxic. Anti-inflammatory activity was studied in a model of acute inflammation of the foot of mice caused by subplantar administration of 0.1 ml of 1% carrageenan solution. The antiexudative activity of the infusion was 17.5%. The analgesic activity of the infusion was studied on the model of chemical pain irritation ("cramps") caused by the administration of acetic acid in mice. It was found that the analgesic effect was 27.1%.

Keywords: *Lactuca serriola* L., herb, acute toxicity, anti-inflammatory activity, analgesic activity.

RESUME

The article presents the results of a study of acute toxicity, anti-inflammatory and analgesic activity of compass lettuce herb. It was found that a single infusion of the infusion in doses from 1 g / kg to 5 g / kg made it possible to classify it as practically non-toxic. The anti-inflammatory activity was studied in a model of acute inflammation of the foot of mice caused by subplantar administration of 0.1 ml of 1% carrageenan solution. The antiexudative activity of the infusion was 17.5%. The analgesic activity of the infusion was studied in a model of chemical painful irritation of cramps caused by the administration of acetic acid in mice. It was found that the analgesic effect was 27.1%.

Keywords: *Lactuca serriola*, herb, acute toxicity, anti-inflammatory activity, analgesic activity.

INTRODUCTION

Compass lettuce (*Lactuca serriola* L.) of the Asteraceae family is represented by herbaceous plants, both annual and biennial, widely growing in Russia, including in the regions of the Central Black Earth Region [1].



<https://fishki.net/2056226-lekarstvennye-rasteniya-rossii.html>

Compass lettuce is a plant that grows in weedy places: wastelands, roadsides, along river banks, in gardens, vegetable gardens [1], forms significant thickets in nature and, accordingly, has a sufficient raw material base. It is known from the literature that compass lettuce herb contains sesquiterpene lactones, steroid and triterpene compounds, and flavonoids [2]. Many compounds of the listed groups of biologically active substances are characterized by the presence of anti-inflammatory, analgesic and other types of activity, which is confirmed by the data on the use of plants in folk medicine and some pharmacological studies carried out by foreign authors [3, 4]. All of the above indicates the relevance of further pharmacological study of compass lettuce herb.

The aim of this work is to study the acute toxicity, anti-inflammatory and analgesic activity of the herb compass lettuce.

The object of the study was air-dry crushed raw material (grass) of compass lettuce (*Lactuca serriola* L.). Blooming raw materials were harvested in 2018–2019 in the Kursk region.

#### MATERIALS AND METHODS

The study of acute toxicity, analgesic and anti-inflammatory activity of compass lettuce herb infusion was carried out at the Research Institute of Experimental Medicine, KSMU.

Pharmacological studies were carried out using an infusion of compass lettuce herb, which was prepared in accordance with the State Pharmacopoeia of the XIV edition of "Infusions and decoctions" [5].

The experiments were carried out in accordance with the established documents "On the approval of the rules of laboratory practice" (Ministry of Health of the Russian Federation, order No. 267 dated June 19, 2003), Good Laboratory Practice for Nonclinical Laboratory Studies (FDA, 21 CFR Part 58, 12/22/1978), OECD Principles on Good Laboratory Practice (OECD, ENV / MC / CHEM (98) 17, 1977).

The experiments were carried out on sexually mature white mice weighing 20–25 g.

The animals were kept in a vivarium in type 2L cages with a floor area of 530 cm<sup>2</sup> 5 animals in one cage, access to water is free, as feed was used granulated feed for laboratory animals, feeding the animals once a day, one hour after the intragastric administration of the studied infusion. Lighting mode 12/12.

The basis of the study of acute toxicity was the method of Shtabskiy B.M., according to which the studied infusion of compass lettuce herb was administered in doses from 1 g / kg to 5 g / kg and in volumes from 0.2 to 1 ml (in terms of dry raw material. ) once intraperitoneally. Groups

animals (6 white mice in each) were placed in isolated cages, the studied infusion was injected, observations were carried out for 24 hours, observing the standard temperature and food regime [6].

The anti-inflammatory effect was evaluated under conditions of acute aseptic inflammation of the foot of mice caused by subplantar (under the plantar aponeurosis of the mouse paw) administration of 0.1 ml of 1% carrageenin solution [7, 8].

To study the anti-inflammatory activity, 2 groups of animals (white male mice) were used, 10 animals each in the study and control groups.

An infusion of compass lettuce herb was administered on an empty stomach intragastrically in the morning at the same time using a metal probe with an olive at the end at a dose of 0.5 ml per animal for 7 days. A group of control animals received an equivalent volume of water used to prepare the infusion.

The severity of the anti-inflammatory action was assessed by the degree of inhibition of the increase in foot edema during the use of the infusion in comparison with the control group of animals. One hour after the intragastric administration of infusion or water (in the control group), 0.1 ml of a 1% carrageenin solution was injected subplant into the right paw of each animal. 3 hours after the introduction of phlogistic (carrageenan), the experimental animals were euthanized (by dislocation of the cervical vertebrae) and the right and left feet were removed at the level of the ankle joint. The weight of the foot was measured on an FX-300 electronic balance with an accuracy of 1 mg; the left paw of the same animal was used as a control, into which an equal volume of isotonic solution was injected in parallel with the introduction of phlogistic. The inhibitory effect was calculated using the formula:

$$e_{ing} = \frac{(\Delta M_k - \Delta M_0) \times 100\%}{\Delta M_k}$$

where  $e_{ing}$  - inhibitory effect,  $\Delta M_0$  and  $\Delta M_k$  - the difference between the average weight gain of the edematous feet in the control and experimental groups.

The analgesic activity of compass lettuce herb infusion was studied on the model of chemical pain irritation - writhing caused by the administration of acetic acid in mice [7]. To study the analgesic activity, 2 groups of animals (white male mice) were used, 10 animals in the study and control groups. An infusion of compass lettuce herb was administered on an empty stomach intragastrically in the morning at the same time using a metal probe with an olive at the end at a dose of 0.5 ml per animal for 7 days. A group of control animals received an equivalent volume of water used to prepare the infusion. A dose of 0.5 ml was chosen as the maximum possible for a single intragastric administration to this animal species.

A specific pain reaction of "writhing" (characteristic movements of animals, including contractions of the abdominal muscles, alternating with their relaxation, stretching of the hind limbs and arching of the back) was caused by intraperitoneal administration of 0.75% acetic acid solution at a dose of 0.1 ml for every 10 g of body weight 1 hour after intragastric administration of the test infusion. The counting of the number of "writhings" was carried out within 15 minutes. The pharmacological effect was taken into account by reducing the number of "writhing" in comparison with control animals, calculating it by the formula

$$\frac{C_k - C_0}{C_k} \times 100 \%$$

where  $C_0$  and  $C_k$  - the number of "writhing" in the control group of animals and the group that received an infusion of compass lettuce herb.

Statistical processing of the results of the study of the pharmacodynamics of the compass herb infusion was carried out according to the methods generally accepted in pharmacology, calculating the average values of the indicators (M) and the error of the arithmetic mean ( $\pm m$ ). To determine the reliability

differences between means were used t-test for groups with different variances. The probability of the results obtained was assessed at a significance level of at least 95% ( $p \leq 0.05$ ) [6].

## RESULTS

Studies on the study of the acute toxicity of compass lettuce herb infusion during the first days have shown lethargy, lethargy, and a decrease in the motor activity of animals in animals; these indicators increased with an increase in the dose of the injected extract (infusion). Further, after a day, the condition of the animals returned to normal, and their behavior was comparable to that of intact animals. The experiment did not allow determining LD50, due to the fact that the introduction to animals of the maximum allowable volume of the administered infusion did not cause death of the animals. The results of the experiment showed that the infusion used in the dose ranges from 1000 mg / kg to 5000 mg / kg can be considered "practically non-toxic", in accordance with the classification of EA Luzhnikov. [6].

Subplant injection of 1% carrageenan solution leads to the development of acute inflammatory exudative edema, which in untreated rats reaches a maximum by 3 hours. It is known that, in the first 10–20 minutes, mast cells degranulate and release histamine and serotonin, within 1–2 hours the development of edema is supported by bradykinin and other kinins accumulating in the focus of inflammation, by 3 hours - by prostaglandins. Thus, within three hours in the pathogenesis of carrageenan inflammation, all the main mediators, to which the action of the drug is directed, are included.

The data characterizing the anti-inflammatory activity of the studied infusion of compass lettuce herb are presented in table. 1.

Table 1

Anti-inflammatory activity of compass lettuce herb infusion (*Lactuca serriola* L.)

Preparations, doses (ml / mouse / day)	n	Foot mass gain%	Inhibitory effect%
Control (water) / 0.5 ml	ten	67.7 - 3.7	-
Infusion of herb lettuce compass / 0.5 ml	ten	54.2 - 1.6 *	17.5%

Note: \* - values at  $p \leq 0.05$  in comparison with the control.

The data presented in table. 1, show that intragastric administration for 7 days of the studied infusion at a dose of 0.5 ml per animal (white male mice weighing 20 to 25 g) causes a dose-dependent antiexudative effect, manifested in a decrease in the degree of weight gain in the foot compared to untreated animals, while the anti-inflammatory effect was 17.5%.

Therefore, the data obtained allow us to conclude that the studied infusion has a statistically significant anti-inflammatory activity.

It is known that pain is an integral component of the inflammatory process. The acetic acid "writhing" test is one of the most common in assessing the analgesic activity of non-narcotic analgesics. The pain reaction in this test is due to the activation of the biosynthesis of prostaglandins as a result of moderate short-term irritation of the peritoneum with a weak solution of acetic acid.

Intraperitoneal injection of acetic acid solution to control (untreated) rats causes a painful response in the form of "writhing", which is expressed in contraction of the abdominal muscles and stretching of the hind limbs. The number of "writhings" in such groups during a 15-minute observation period is, as a rule, from 20 to 40 (Table 2).

table 2

Analgesic activity of compass lettuce herb infusion in mice (n = 10)

Group of animals	Dose, ml / day	n	Absolute number "Writhing"	Analgesic effect %
Infusion of herbs compass lettuce	0.5	ten	23.9 ± 1.1 *	27.1%
Control (water)	0.5	ten	32.8 ± 1.9	-

Note: the index \* marks the values at  $p < 0.05$  in comparison with the control

As evidenced by the data presented in table. 2, preliminary administration of compass lettuce herb infusion for 7 days at a dose of 0.5 ml per mouse (weighing 20–25 g) has a statistically significant ( $p < 0.05$ ) analgesic effect, manifested in a decrease in the number of "writhing" compared to mice that received water. The value of the analgesic effect of the studied infusion is 27.13%, which indicates the presence of an analgesic effect in the studied infusion when used for 7 days at the maximum dose for this type of animals.

#### DISCUSSION AND CONCLUSIONS

1. Conducted experimental studies to study the acute toxicity of the infusion compass lettuce herbs have shown that it belongs to the class of practically non-toxic.
2. Study of the anti-inflammatory effect of compass lettuce herb infusion on a model corragenin edema showed the presence of an anti-inflammatory effect significantly superior to the control group of animals, while the anti-inflammatory effect was 17.5%.
3. The results obtained on the study of the analgesic activity of the herb infusion of lettuce compass showed that the infusion can be an analgesic agent, while the analgesic effect was 27.1%.

#### LITERATURE

1. Illustrated guide to plants of Central Russia. Volume. 3: Angiosperms (dicotyledonous: dicotyledonous) / I.A. Gubanov, K.V. Kiseleva, V.S. Novikov, V.N. Tikhomirov. - M.: T-in scientific publications KMK, Institute of technological research, 2004. - 520 p.
2. Mohammad, A. Traditional use of Kahu (*Lactuca scariola* L.) - a review / A. Mohammad // Global J. Res. Med. Plants & Indigen. Med. - 2013. - Vol. 2, Issue 6. - P.465–474.
3. Karomatov, I. D. Lettuce, lettuce is a promising medicinal plant / I.D. Karomatov, A.M. Ramazonovna // Biology and integrative medicine. Phytotherapy [Electronic resource]: electron. scientific zhurn. - 2018. - No. 4. - P.122–129.
4. Pharmacological effects of *Lactuca scariola* L. in experimental model of gastrointestinal, respiratory and vascular ailments / KH Janbaz, MF Latif, F. Sagib [et al.] // Evidence-based complementary and alternative medicine. - 2013. - P.1-9.
5. State Pharmacopoeia of the Russian Federation. XIV edition. T.4. Moscow: Federal Electronic Medical Library, 2018.1833p. [State Pharmacopoeia of Russian Federation. XIV edition. Vol. 4. Moscow: Federal electronic medical library, 2018. 1883 p.] URL: <http://femb.ru/femb/pharmacopea.php>.
6. Guidelines for experimental (preclinical) study of new pharmacological species / ed. RU. Khabrieva. - M., 2005. -- 832 p.
7. Guidelines for conducting preclinical studies of drugs Part first. - M.: Grif and K, 2013. - P.748–761.
8. Han, K.H. Inflammatory edema modeling: are the models interchangeable? / K.Kh. Han, V.N. Khaziakhmetova, L.E. Ziganshina // Experimental and Clinical Pharmacology. - 2015. - No. 7 (78). - pp. 24–31.

Author's address

D.Pharm.Sci. Bubenchikov R.A., Professor of the Department of Pharmacognosy and Botany  
bubenhikova.ksmu@yandex.ru

---

Study of anti-inflammatory and analgesic activity of compass lettuce herb (*Lactuca serriola* L.) / E.B. Artyushkova,  
M.P. Gladchenko, T.V. Korableva, R.A. Bubenchikov // Traditional Medicine. - 2020. - No. 4 (63). - S.47-50.

[To favorites](#)