

Study of the anti-inflammatory and antibacterial activity of Thyme
two-faced (*Thymus dimorphus* Klok. et Shost)

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Shost

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SUMMARY

V article the results of the study anti-inflammatory and antibacterial activity of thyme two-faced. When studying anti-inflammatory activity of thyme two-faced infusion determined its effect on different stages of the inflammation process. The study of antibacterial activity was determined in vitro on reference strains of test cultures: *Pseudomonas aeruginosa*, *Escherichia Coli*, *Proteus vulgaris*, *Staphylococcus aureus*, *Bacillus cereus*, *Candida*. As a result of the study, it was found that the infusion of the herb of thyme two-faced belongs to the class of practically non-toxic, its anti-inflammatory effect is manifested in the suppression of the stage of exudation and proliferation. It has also been shown that the herb of two-faced thyme in its antibacterial and anti-inflammatory effect is close to the official form - the herb of creeping thyme.

Keywords: *Thymus dimorphus* Klok. Et Shost., Antiexudative activity, antiproliferative activity, antibacterial activity.

RESUME

The results of anti-inflammatory and antibacterial activity of *Thymus dimorphus* are presented. Anti-inflammatory activity of infusion of *Thymus dimorphus* was determined was by its impact on the different stages of the process of inflammation. The study determined the antibacterial activity in vitro on a reference strains of test cultures: *Pseudomonas aeruginosa*, *Escherichia Coli*, *Proteus vulgaris*, *Staphylococcus aureus*, *Bacillus cereus*, *Candida*. The study found that the infusion of herb *Thymus dimorphus* is classified as practically non-toxic, antiinflammatory effect is manifested in its oppression of the stage of exudation and proliferation. It was also shown that antibacterial and anti-inflammatory effects of *Thymus dimorphus* is similar to the *Thymus serpyllum*.

Keywords: *Thymus dimorphus* Klok. Et Shost., Anti-exudative activity, antiproliferative activity, antibacterial activity.

Search vegetable raw materials, possessing anti-inflammatory and antibacterial activity is an urgent task. One of these plants is the two-faced thyme (*Thymus dimorphus* Klok. Et Shost.), A subshrub of the family Labiatae (Lamiaceae), which grows in the European part along with

with creeping thyme. Under natural conditions, procurers do not distinguish between species and, along with creeping thyme, procure other species, but their chemical composition and pharmacological activity have not been sufficiently studied [3, 4].

The purpose of the work: was to study the anti-inflammatory and toxicity, antibacterial activity of thyme two-faced.

The object of the study was air-dry crushed herb of two-faced thyme. Raw materials were procured in 2013–2014. in the Kursk region during the flowering period of the plant.

Materials and research methods

For pharmacological studies, an infusion of two-faced thyme herb was used. The effectiveness of the pharmacological activity of the herb infusion of two-faced thyme was compared with the infusion of the official type - creeping thyme. The infusion was prepared according to the method of the GF XI edition in a ratio of 1:10 [2]. 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 of 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 acute toxicity of the studied infusion was determined by the method of Shtabsky B.M. The studies were carried out on outbred white mice of both sexes, weighing 18.0–20.0 g. 2 to 1 ml. After the introduction of the studied infusion, each group of animals (at least 6 animals) was placed in an isolated cage at a standard temperature and food regime and monitored for 24 hours [5].

The study of anti-inflammatory activity was carried out on outbred mice weighing 18.0–20.0 g, white outbred rats weighing 180.0–220.0 g. The animals were kept on a regular diet in the vivarium of Kursk State Medical University.

To assess the anti-inflammatory activity of thyme two-faced infusion, its effect on different stages of the inflammation process was determined [1]. The antiexudative effect was studied in a model of acute inflammatory edema caused by subplantar injection of 0.05 ml of a 2.5% formalin solution into the hind paw of a mouse. An infusion of creeping thyme herb was used as a reference drug. In the control group, mice received an equivalent volume of purified water. In the course of the experiment, infusions of the aerial part of thyme two-faced, creeping thyme were injected intraperitoneally at doses of 1 g / kg (in terms of dry raw materials) of body weight 2 hours before the introduction of the phlogogenic agent, and then 5 and 18 hours after its administration.

Antiproliferative properties were studied using the "cotton granuloma" model. In the rats under light ether anesthesia, the hair was carefully cut off in the back area and a longitudinal incision of the skin and subcutaneous tissue 1–2 cm long was made under aseptic conditions. weighing 25 mg and 1–2 sutures were applied. After 7 days, the animals were sacrificed, the implanted ball with the granulation tissue formed around it was removed and dried to constant weight at 55–60 ° C. The mass of the formed granulation fibrous tissue was determined by the difference between

mass of dried granuloma and mass of implanted cotton ball. The control group of animals received an equivalent volume of purified water.

The study of antibacterial activity was determined in vitro on reference test culture strains: *Pseudomonas aeruginosa*, *Escherichia Coli*, *Proteus vulgaris*, *Staphylococcus aureus*, *Bacillus cereus*, *Candida*. The obtained results were processed statistically according to generally accepted methods. The reliability of the results was assessed using the Student's test.

results

A study of the acute toxicity of an infusion of thyme two-faced herb showed that in the course of the experiment, inhibition of the motor activity of animals, lethargy, and lethargy were observed, and these phenomena increased with an increase in the dosage of the infusion administered. However, by the end of the day, the behavior of the animals did not differ from the intact ones. LD₅₀ in the experiments it was not established, because when the maximum allowable volume of the administered extraction dose was introduced, the death of the animals was not observed. Based on the available data, we can say that the studied infusion according to the hygienic classification of poisons by E.A. Luzhnikov, substances with LD₅₀ 1500 mg / kg [5]. The study of the antiexudative activity of the infusion of the aerial part of thyme two-faced on the model of inflammation caused by formalin showed that the administration of the infusion led to inhibition of edema (39.72 ± 1.80 mg) compared to the control ($58.272.65$ mg) (Table 1). At the same time, the antiexudative activity of two-faced thyme infusion is comparable to the infusion of an official species of creeping thyme (35.03 ± 0.93 mg).

Table 1

Influence of the infusion of the aerial part of thyme two-faced on the phase of exudation of the process inflammation (formalin edema model)

Препарат	Доза	Вес лапок, мг		Величина отека		Противовоспалительный эффект, %
		правой	левой	(M ± m), мг	%	
Контроль		184,78	126,51	$58,27 \pm 2,65$	100,00	
Настой тимьяна двуликого	1 г/кг	181,48	141,76	$39,72 \pm 1,80^*$	68,17	31,83
Настой тимьяна ползучего	1 г/кг	159,35	124,32	$35,03 \pm 0,93^*$	60,12	39,88

* – различия по сравнению с контролем статистически достоверны при $P < 0,05$; число животных в контроле и в каждом варианте опыта 6.

Studies have shown that, along with the antiexudative effect, the infusion of the aerial part of thyme two-faced has an effect on the proliferative phase of inflammation, slowing down the development of granuloma, less pronounced than that of creeping thyme, but reliable compared to the control (Table 2).

table 2

The influence of the infusion of the aerial part of thyme two-faced on the development of "cotton granulomas" when administered orally

Препарат	Доза	Масса сухой грануляционно-фиброзной ткани, мг	Угнетение пролиферации, %
Контроль	–	140,55 ± 8,07	
Настой тимьяна двуликого	1 г/кг	48,27 ± 7,33*	65,66
Настой тимьяна ползучего	1 г/кг	30,70 ± 3,84*	78,16

Примечание: * – различия по сравнению с контролем статистически достоверны при $P < 0,05$; число животных в контроле и в каждом варианте опыта 6.

Thus, in the control group of animals, the weight of granulation tissue was 140.55 ± 8.1 mg. We have taken this value as 100.00%. Under the influence of two-faced thyme infusion, the size of the granulation tissue compared with the control data was less and amounted to 48.27 ± 7.33 mg, which led to a significant decrease in the inflammatory process by 65.66%.

The study of antibacterial activity showed that the infusion of thyme two-faced herb showed pronounced antimicrobial activity against *Staphylococcus aureus* cultures at a concentration of 1: 2, 1: 4, 1:10, where there was no growth of this culture and cultures of *Proteus vulgaris*, *Escherichia Coli*, *Bacillus cereus* in concentration 1: 2 and 1: 4. Weak growth of *Proteus vulgaris* and *Escherichia Coli* cultures was observed under the influence of two-faced thyme infusion at a concentration of 1:10. In relation to fungi of the genus *Candida*, the herb infusion of two-faced thyme was inactive. Thus, two-faced thyme has a more pronounced antibacterial activity in comparison with creeping thyme against the cultures of *Staphylococcus aureus*, *Escherichia Coli*.

conclusions

1. It has been established that the herb infusion of two-faced thyme belongs to the class practically non-toxic.
2. The anti-inflammatory effect of two-faced thyme infusion is manifested in inhibition of the stage of exudation and proliferation.
3. It has been shown that the herb of thyme two-faced for antibacterial and anti-inflammatory action is close to the official form - creeping thyme herb.

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