



Sciences of  
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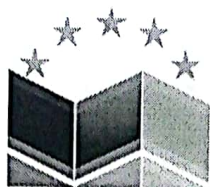
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# CONTENT

## CULTUROLOGY

- Kigel T.*  
EATING METAPHORS IN ENGLISH AND HEBREW .....3

## ECONOMIC SCIENCES

- Kiguradze K.*  
UNDERSTANDING HIGH PERFORMANCE WORKPLACE  
AND CHARACTERISTICS OF HIGH-PERFORMANCE  
WORKPLACE .....13
- Kiguradze H.*  
IMPACT OF QUALITY AND SECURITY MANAGEMENT  
ON HUMAN CAPITAL BUILDING .....15

## HISTORICAL SCIENCES

- Madreymov E.*  
THE POST-WAR STATE OF THE AGRICULTURAL  
SECTOR OF THE ECONOMY OF KARAKALPAKSTAN ...17

## MEDICAL SCIENCES

- Kryvetskiy V., Bilous O.*  
PATHOMORPHOLOGICAL CHANGES IN THE THYROID  
GLAND IN DIFFUSE TOXIC GOIT .....21
- Yaneva R., Popov N., Zlatanova T.,  
Petrova-Gotova T., Shtereva-Tzouni D.,  
Naseva E., Lazarova M., Djugalarska M.*  
STUDENT SATISFACTION WITH THE QUALITY OF  
HYBRID TEACHING IN THE EDUCATION PROCESS OF  
THE DEPARTMENT OF HEALTH ECONOMICS .....24
- Khakimov Z., Rakhmanov A.,  
Khadjieva U., Tursunova L., Babazhanov A.*  
STUDY INFLUENCE OF A NEW PHYTCOMPOSITION TO  
THE COURSE OF ASEPTIC ARTHRITIS .....28
- Sheptukha S., Hubar O.*  
A CLINICAL CASE OF MULTIGLANDULAR  
PARATHYROID LESION AND THYROID CANCER: OWN  
OBSERVATION .....32

## PEDAGOGICAL SCIENCES

- Erekshcheva V.*  
EARLY COMPREHENSIVE ASSISTANCE TO CHILDREN  
WITH DISABILITIES AND THEIR FAMILIES .....37
- Havryshchuk I., Kozak N.*  
PRODUCTION AND GRAPHIC SITUATIONS AS A  
MEANS OF IMPROVING THE GRAPHIC TRAINING OF  
FUTURE WORKERS .....40

## PHYSICS AND MATHEMATICS

- Ibrahimov F., Aliyeva G.*  
INTERPRETATION OF THE "TEACHING STRATEGIES  
BLOCK" OF THE MATHEMATICS SUBJECT  
CURRICULUM AT THE GENERAL EDUCATION LEVEL  
BASED ON THE "SYSTEM-STRUCTURE" APPROACH ..48

## SOCIAL SCIENCES

- Lysenko T.*  
AS FOR THE CLARIFICATION OF THE SPECIFIC AND  
STATUS OF THE PUBLIC ANALYTICAL CENTERS IN  
MODERN WESTERN SCIENTIFIC DISCOURSE .....56
- Khomenko I., Yelisovenko  
Y., Nabrusko V., Fomenko V.*  
STYLE AGAINST RATIONALITY: UTILITARISM IN GENRE  
LITERATURE AND TELE ARTS OF THE XXI CENTURY:  
THE VIEW OF RESEARCHERS SOCIAL COMMUNICATIONS  
.....61

## TECHNICAL SCIENCES

- Almammadov M.*  
I. ASYMPTOTIC FORMULAS FOR THE SOLUTIONS OF  
LINEAR INTEGRO-DIFFERENTIAL EQUATION  
 $I(y) = \lambda y$  .....71
- Sultanova A., Guliyeva Sh.*  
GENERALIZED EXPERT OPINION BASED ON FUZZY  
NUMBER.....78
- Aliev A., Maharramov Z.*  
FEATURES OF BUILDING MODELS OF USER  
PREFERENCES FOR CLOUD SERVICES AND THEIR  
CLASSIFICATION .....82
- Sharifzade E.*  
COMPARATIVE ANALYSIS OF TRADITIONAL  
FORECASTING METHODS AND METHODS BASED ON  
MACHINE LEARNING .....85
- Seyidova I., Xu Xin*  
APPLICATION OF TOPSIS METHOD FOR DECISION  
MAKING.....90
- Petrosova L., Avezova N.*  
IMPROVING WORK SAFETY INCLUDING THE HUMAN  
FACTOR.....94
- Berdibekov A., Yurov V.,  
Dolya A., Guchenko S.*  
FRICTION IN HIGH-ENTROPY CrNiTiZrCu ALLOYS .....98



## STUDY INFLUENCE OF A NEW PHYTOCOMPOSITION TO THE COURSE OF ASEPTIC ARTHRITIS

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### ABSTRACT

The anti-exudative activity of a new phytocomposition was studied on male white rats on a model of dextran-induced aseptic arthritis. It has been established that the studied phytocomposition clearly suppresses the development of the exudative phase of inflammation, especially at a dose of 50 mg/kg.

**Keywords:** phytocomposition, medicinal plants, inflammation, exudation.

The discovery and development of new affordable effective anti-inflammatory medicines is one of the important tasks of pharmacology. In this regard, we studied the anti-inflammatory activity of dry extracts of the following medicinal plants: *Radix Glycyrrhiza glabra*, *Fructus Rosae*, *Equisetum arvense L.*, *Chamomillae flores* and *Aerva lanata* [1,2]. At the same time, their combination in various ratios, in our opinion, would allow the detection of effective phytocompositions with an expressed anti-inflammatory effect. For

this purpose, compositions of medicinal plants were developed that differ in their composition and the ratio of extracts in the mixture, conventionally designated "A", Table 1 provides information on the composition and ratios of the extracts of the studied medicinal plants.

The aim of this work was to study the antiexudative activity of new phytocompositions on experimental animals with dextran-induced aseptic arthritis.

Table 1

The composition of the phytocomposition (ratios in grams)

№	medicinal plants	Composition A <sub>1</sub>	Composition A <sub>2</sub>	Composition A <sub>3</sub>
1	<i>Radix Glycyrrhiza glabra</i>	1,0	1,0	0,5
2	<i>Fructus Rosae</i>	1,0	0,5	1,0
3	<i>Equisetum arvense L.</i>	1,0	1,0	0,5
4	<i>Chamomillae flores</i>	1,0	0,5	1,0
5	<i>Aerva lanata</i>	1,0	1,0	0,5

### Materials and methods of research

Experimental studies were carried out on adult white male rats weighing 140-160 g. After a two-week quarantine, prior to the start of the experiment, all animals were examined, weighed, age, sex, physical activity and condition of the skin were taken into account. Each experimental group consisted of six individuals. During experimental studies, laboratory animals were kept in a vivarium in plastic cages, with sawdust bedding at a temperature of 20-24°C, a humidity of at least 50%, in a well-ventilated room and day/night light regimen. Animal feeding was calculated according to age. The study was subjected to dry extracts of medicinal plants that were prepared by employees of the Research Institute of Chemistry and Pharmaceutics of the Republic of Uzbekistan.

LIV-52 (Himalaya Drug Co., India) was used as a reference drug, which is a mixture of dry medicinal plants with anti-inflammatory activity [8, 9]. To study

the anti-exudative activity of the above compositions of dry extracts of medicinal plants was used by using the classical model of experimental aseptic arthritis induced by a 6% solution of dextran [4,5,6,7]. The phlogogen solution was injected (0.1 ml per animal) subplantarily (under the plantar aponeurosis) into the hind right paw of rats. The volume of paws of rats before the injection of the phlogogen was considered initial and was taken as 100%. One day and 1 hour before the reproduction of aseptic arthritis, rats of the control group were administered intragastrically an equivalent amount of water as well as animals of the experimental groups were administered the phytocomposition in various doses of 25, 50 and 100 mg/kg, and LIV-52 - 100 mg/kg. The volume of the paws of the animals was measured by the oncometric method using a plethysmometer (Ugo Basile Srl, Italy) before and after the injection of dextran. The anti-inflammatory activity of the studied compounds was judged by the difference in



paw volume before the start of the experiments and at the moment of maximum development of edema. The value of anti-inflammatory activity (AIA) of the preparations was calculated according to the formula (5):

$$AIA = \frac{V_{con} - V_{exp}}{V_{con}} \times 100 = \%$$

where;  $V_{con}$  - average increase in paw volume in control group,  $cm^3$ ,

$V_{on}$  - average increase in paw volume in experimental group,  $cm^3$ .

It is known that if the AIA value exceeds more than 30%, then, as is commonly considered, the drug has an expressed anti-inflammatory effect [3].

The results of the study were statistically processed using the Biostat 2009 software package. The data are presented as the mean (M) and standard error of the mean value (m). Student's t-tests were used to test statistical hypotheses about the difference between the study groups. Statistically significant changes were taken at a probability level of 95% or more ( $p < 0.05$ ).

**Results of the study and their discussion**

The results of the experimental studies showed that the phytocomposition conventionally named "A" had a certain AIA. So, after 1, 2, 3 and 4 hours from the start of the phlogogen injection under the influence of dextran, an increase in the volume of the paws of rats is noted compared to the initial one by 154.1; 129.5; 114.7 and 106.5%, respectively. It can be seen that subplantar injection of dextran leads to significant paw edema -

more than 2.5 times. In contrast, under the influence of mixture "A", the intensity of edema formation was noticeably less. As can be seen from the data in Table 1, the preventive administration of the phytocomposition "A<sub>1</sub>" at a dose of 50 mg/kg, the increase in the volume of the paws was significantly low compared to the control, and it respectively was 100.0; 83.9; 70.9 and 64.0% compared with the initial volume of the paws in the studied observation periods. Calculation of AIA of the medicine in the indicated periods of observation showed the following values: 34.0; 34.2; 37.1 and 38.4%. When animals treated with the "A<sub>2</sub>" mixture, the AIA was somewhat lower than the "A<sub>1</sub>" mixture. Thus, the AIA of the A<sub>2</sub> mixture in the indicated periods of observation was 29.8; 29.1; 31.4 and 32.3%. It is noteworthy that the AIA of the mixture "A<sub>3</sub>" was significantly high not only in comparison with the mixture "A<sub>2</sub>", but also the mixture "A<sub>1</sub>" (Figure 1). The AIA values of the "A<sub>3</sub>" mixture, as can be seen from the data in table 1, was 43.6; 44.3; 45.7 and 46.1%. Summarizing the above material, we can conclude that the composition of extracts of medicinal plants "A" have a high AIA, especially phytocomposition "A<sub>3</sub>", where the ratio of extracts of medicinal plants was in the following proportion: *Radicis Glycyrrhiza glabra*, *Fructus Rosae*, *Equisetum arvense L.*, *Chamomillae flores* and *Aerva lanata* (0.5:1.0:0.5:1.0:0.5).

Table 1  
Study of the effect of various phytocompositions of the extract of mixture "A" on the course of aseptic dextran-induced arthritis (M±m, n=6)

Groups	Dose mg/kg	Paw volume, $cm^3$ (hours of experiment)				
		Initial	1 hour	2 hour	3 hour	4 hour
Control	-	0,61 ± 0,02	1,55 ± 0,07*	1,40 ± 0,08*	1,31 ± 0,09*	1,26 ± 0,09*
Composition "A <sub>1</sub> "	50	0,62 ± 0,02	1,24 ± 0,08*	1,14 ± 0,08*	1,06 ± 0,09*	1,02 ± 0,09*
Composition "A <sub>2</sub> "	50	0,61 ± 0,02	1,27 ± 0,09*	1,17 ± 0,09*	1,09 ± 0,09*	1,05 ± 0,10*
Composition "A <sub>3</sub> "	50	0,66 ± 0,02	1,19 ± 0,06*	1,10 ± 0,08*	1,04 ± 0,08*	1,01 ± 0,09*
LIV-52	100	0,61 ± 0,02	1,29 ± 0,07*	1,18 ± 0,06*	1,11 ± 0,06*	1,06 ± 0,06*

Note: \* - statistically significant difference in relation to the initial indicators of the corresponding groups of animals  $P < 0.05$ .

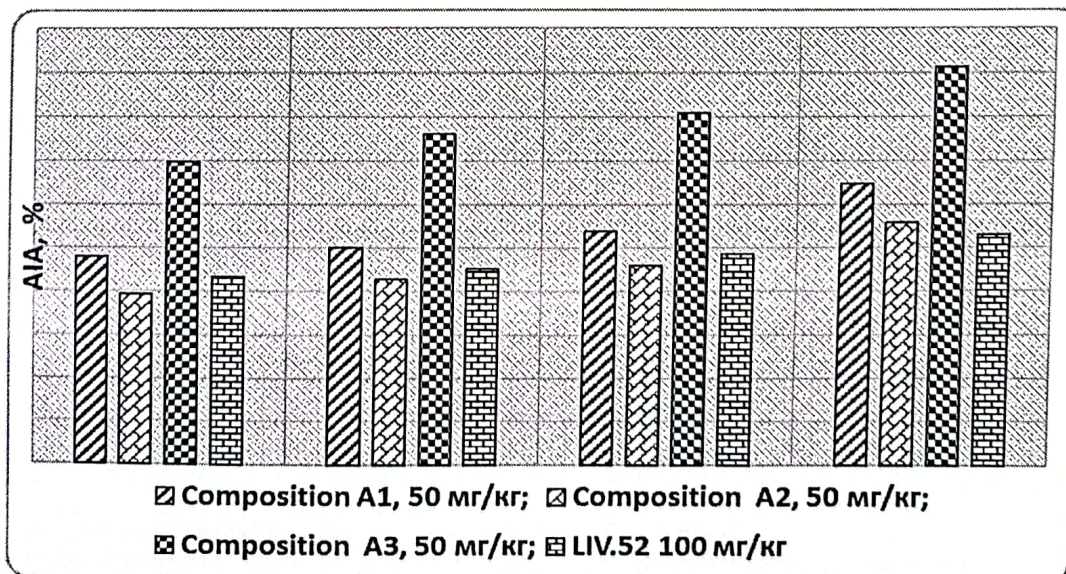


Figure 1. Anti-inflammatory activity of various compositions of mixture "A" and LIV-52 in dextran-induced aseptic arthritis.



It should be noted that herbal medicines containing flavonoids have AIA, for example, LIV-52 [4,5]. In this regard, it was interesting to compare the obtained results with PVA LIV-52. As can be seen from the data in table 1 under the influence of LIV-52, the development of paw edema under the influence of dextran was somewhat less than the control group and AIA in the studied observation periods was 27.6; 27.8; 28.6 and 30.6%, respectively. It can be seen that LIV-52 by its pharmacological activity is clearly inferior than the studied mixture "A", especially "A3".

Thus, the analysis of the results of the experimental studies given above shows the presence of a high AIA of mixtures "A3" that is superior in its effectiveness to LIV-52.

From a pharmacological point of view, it is necessary to establish an effective dose of the medicine,

which must be used in clinical trials of new medicines. Based on this, in a separate series of experiments on the model of aseptic arthritis induced by dextran, we studied various doses of the "A<sub>3</sub>" mixture. The latter was chosen by us considering its high AIA in comparison with other options of the ratio of herbal extracts.

The results of the experimental studies were shown in table 2 that the mixture "A3" exhibits high AIA, as the results of the previous series of experiments. AIA of this mixture was slightly lower at a dose of 100 mg/kg and especially at 25 mg/kg than at 50 mg/kg (Figure 2).

So, the AIA of the mixture "A3" at a dose of 25 mg/kg was 28.7%, and at a dose of 100 mg/kg - 36.6%, then at a dose of 50 mg/kg - 41.6% in the first hour of observation. This ratio of the level of AIA of mixture "A3" depending on different

Table 2

Study of anti-inflammatory activity of various doses of mixture "A<sub>3</sub>" in dextran- induced aseptic arthritis  
(M±m, n=6)

Groups	Dose mg/kg	Paw volume, cm <sup>3</sup> (hours of experiment)				
		Initial	1 hour	2 hour	3 hour	4 hour
Control	-	0,56 ± 0,02	1,57 ± 0,07*	1,49 ± 0,08*	1,41 ± 0,08*	1,35 ± 0,06*
Composition "A <sub>3</sub> "	25	0,55 ± 0,03	1,27 ± 0,05*	1,20 ± 0,05*	1,12 ± 0,05*	1,07 ± 0,05*
Composition "A <sub>3</sub> "	50	0,49 ± 0,02	1,08 ± 0,05*	1,01 ± 0,05*	0,95 ± 0,05*	0,90 ± 0,04*
Composition "A <sub>3</sub> "	100	0,53 ± 0,03	1,17 ± 0,06*	1,11 ± 0,06*	1,05 ± 0,06*	1,01 ± 0,06*

Note: \* - statistically significant difference in relation to the initial indicators of the corresponding groups of animals P<0.05.

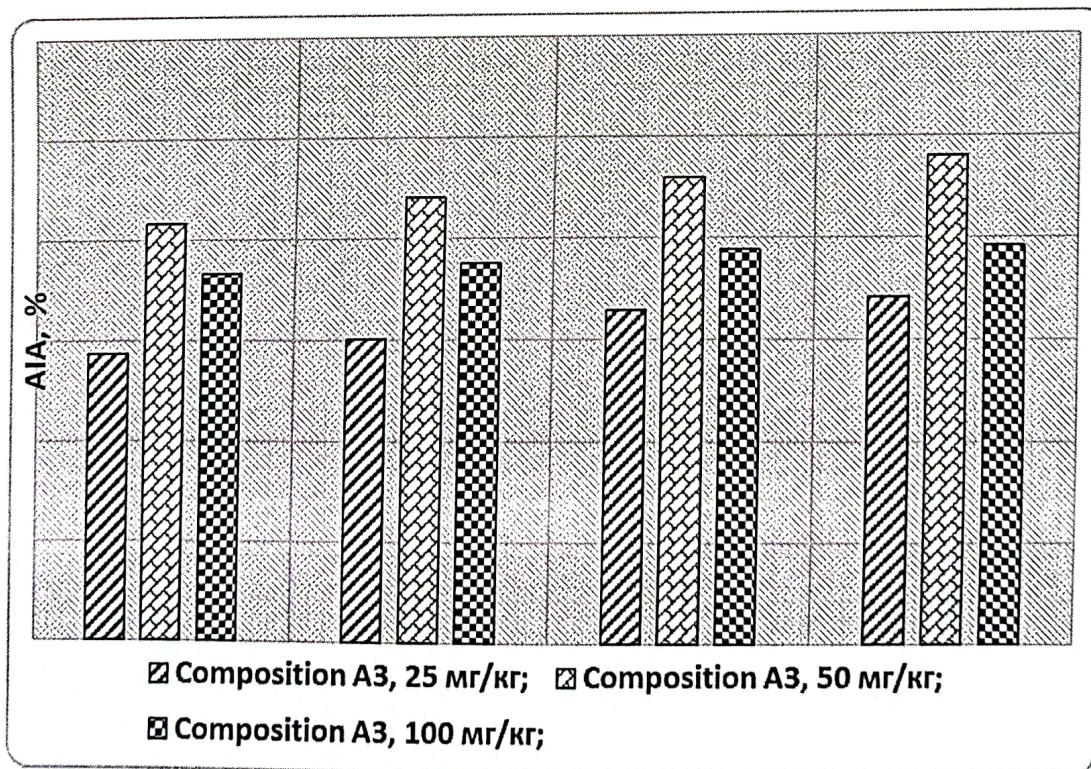


Figure 2. Anti-inflammatory activity of different doses of mixture "A<sub>3</sub>" in dextran- induced aseptic arthritis.

doses were maintained in subsequent periods of observation. Based on the results of experimental studies, it can be considered that an effective dose of anti-inflammatory action is 50 mg/kg.

#### Conclusions

1. Phytocomposition consisting medicinal plants from the flora of Central Asia has a distinct anti-exudative activity.

2. The degree of anti-inflammatory activity of the phytocomposition depends on the administered dose. Its effective dose is 50 mg/kg.

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