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BIOLOGICALLY ACTIVE SUBSTANCES OF A SEDATIVE DRUG

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ABSTRACT

As a result of the research, the amino acid and elemental composition of the liquid extract "Phlegmen" was determined, and it was found that the liquid extract contains 18 amino acids and 39 macro and micro elements. Among the collection of amino acids, glutamic acid prevails, which is used in the treatment of diseases of the central nervous system. It follows from this that the amino acids of the liquid extract under study can participate in the manifestation of the pharmacological activity of the liquid extract. Among the macro and microelements were found: magnesium, a deficiency, which leads to anxiety, fear, confusion, depression. Macronutrients Phosphorus and bromine, which have a pronounced sedative effect and have a beneficial effect on the nervous tissue, restoring performance after emotional and physical stress. The macronutrient lithium, which prevents the development of neuropsychic diseases and has a positive effect on the treatment of schizophrenia. Zinc deficiency is of paramount importance, since it not only leads to underdevelopment of the nervous and reproductive systems, but is also deeply associated with problems of immunodeficiency. T-lymphocytes in conditions of zinc deficiency are inactive. Lithium in the liquid extract contains 0.009%. The data allow us to conclude that the amino acid and elemental composition of the liquid extract is very diverse and can have a complex effect, accordingly.

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抽象的

经研究，确定了“**痰液**”**提取液的氨基酸和元素**组成，发现该提取液含有18**种氨基酸和**39**种宏量和微量元素。在氨基酸的集合中，以谷氨酸占**优势，用于治疗中枢神经系统疾病。由此可见，所研究的液体提取物的氨基酸可以参与液体提取物药理活性的表现。在宏量和微量元素中发现：镁缺乏，会导致焦虑、恐惧、困惑、抑郁。大量营养素磷和溴，具有明显的镇静作用，对神经组织有益，可在情绪和身体压力后恢复表现。宏量营养素锂，可防止神经精神疾病的发展并对精神分裂症的治疗产生积极影响。缺锌至关重要，因为它不仅会导致神经和生殖系统发育不良，而且还与免疫缺陷问题密切相关。缺锌条件下的 T **淋巴**细胞是不活跃的。液体提取物中的锂含量为 0.009%。**数据使我**们得出结论，液体提取物的氨基酸和元素组成非常多样化，因此会产生复杂的影响。

关键词：氨基酸、缬氨酸、异亮氨酸、亮氨酸、苏氨酸、蛋氨酸、赖氨酸、苯丙氨酸、色氨酸、组氨酸、常量营养素。

INTRODUCTION

Numerous studies have established that minerals and amino acids play an important role in the human body, since without them the correct course of vital processes is impossible. In addition, they ensure the formation of the chemical structure of all human tissues, including muscle. Amino acids and individual chemical elements not only have a certain pharmacological effect, but can also exhibit synergism in relation to a number of substances, therefore, combined drugs with multifunctional properties can be obtained from plants [2,5]. In addition, macro, microelements, as well as amino acids of plant origin are better absorbed by the human body, since they are found in the plant in "biological" concentrations. In addition, amino acids contribute to the normal performance of mineral substances in their functions in the body. Therefore, the problem of systematic study of the amino acid and mineral composition of medicinal plants and herbal remedies based on them is of great importance for pharmacy [11; 12].

Purpose of the study. The study of the amino acid and mineral composition of the sedative liquid extract "Phlegmen" was carried out.

MATERIALS AND METHODS

Everyone knows that amino acids are an integral part of proteins, enzymes, vitamins and other organic compounds important for the body. Plants synthesize all amino acids, in contrast to the body of animals and humans, which are unable to synthesize some of them (the so-called essential amino acids). The human body replenishes the deficiency of essential amino acids with plant foods, and in the case of medical indications, in the form of medicinal preparations containing these compounds. Many amino acids

are not only of great physiological importance, but are highly effective pharmacological substances [9,10,].

According to the WHO, a significant part of the world's population suffers from neuropsychiatric disorders during their life. For the treatment of these types of disorders, sedatives of herbal origin are often used, which is due to the wide spectrum of their action due to the presence of a complex of active substances in them, their ease of use, ease of dosage, a minimum of contraindications and side effects.

It should be noted that the majority of sedative medicines, as well as other medicines registered in the state register of medicines and medical devices and permitted for use in medical practice of our republic, are imported into our republic by import. In this regard, the government of our country has adopted a number of documents and measures aimed at the localization and import substitution of pharmaceutical products, providing the population and medical institutions with affordable, competitive, effective and safe medicines and developing the production of medicines and biologically active food supplements based on local medicinal plants at domestic pharmaceutical enterprises.

Taking this into account, from the plants most often used in the formulation of sedatives and having industrial reserves in the republic, namely Regel's zopnik, Turkestan motherwort, peppermint and licorice, we previously developed a collection and on its basis a sedative liquid extract was obtained "Phlegmen" [3,13]. The liquid extract from the sedative collection "Phlegmen" was obtained by the percolation method using 70% ethanol.

One of the urgent problems of the modern pharmaceutical industry is the search for new domestic sources of biologically active substances and the development of drugs based on them. Among such biologically active substances are amino acids.

Amino acids - As part of proteins, they play one of the most important roles in the body. Almost all tissues are formed from them: skin, hair, ligaments, tendons. There are three types of them: replaceable, conditionally replaceable and irreplaceable. Essential amino acids are supplied to the body with food and can be synthesized in it. Essential amino acids must be supplied to the body from the outside. Conditionally nonessential amino acids, if necessary, can be synthesized by the body from essential amino acids. There are twenty in total in nature there are compounds from which proteins are formed. Nonessential amino acids include: glutamic acid, glycine, aspartic acid, serine, cysteine, tyrosine, alanine, proline. Essential amino acids are those amino acids that our body cannot produce on its own, they must be supplied with protein foods. Essential amino acids include: valine, isoleucine, leucine, threonine, methionine, lysine, phenylalanine, tryptophan, histidine. Conditionally essential amino acids include: arginine, tyrosine, cysteine. Each of them is responsible for a specific function [1,9,10].

As for the sources of biologically active substances, including amino acids, one of them is plant raw materials. In turn, it should be noted that biologically active substances of plant origin differ from synthetic compounds in that they are in plants in complexes that are easily assimilated by the body and biologically available concentrations [11, 14]. Based on the above, this work, we decided to devote the study of one of the groups of such biologically active substances of the liquid extract "Phlegmen" - amino acids in order to identify their possible participation in

the manifestation of the sedative effect of the drug.

RESULTS AND DISCUSSION

For this purpose, we decided to review the methods for the analysis of amino acids in various objects (and primarily in drugs) described in the literature. At the same time, it was established that there are currently many methods for determining amino acids in various objects. Among them, the most common are methods for the determination of amino acids by reversed-phase and cation-exchange HPLC, as well as electrophoretic methods. Considering the high prevalence and a number of advantages over other methods, we preferred HPLC when choosing a method for analyzing amino acids. In particular, the improvement of HPLC technology and its wide practical application makes it possible to solve the problems of separation and quantitative determination of very small amounts (10 mg / kg and below) of the determined components in complex objects. However, the absence of chromophore groups in most amino acid molecules requires a derivatization step when using this method. At the same time, various reagents have been proposed for pre- and post-column derivatization.

Thus, phosphate buffer with fluorometric detection, the simultaneous determination of glutathione, glutamylcysteine, and 16 amino acids was carried out using o-phthalic aldehyde as a derivatizing agent in the works of a number of researchers on the C18 column in the mode of gradient elution with a mixture of methanol. And naphthalene dialdehyde was used in the determination of desmosine, isodesmosine and 17 other amino acids in the works of a number of authors. In the separation of eleven combined derivatives of amino acid isomers (UV detection) on a β-cyclodextrin column using a mobile phase methanol - phosphate buffer (pH 6.5) [9, 10].

As you know, for each new medicinal product, a specific analysis technique should be developed. When developing an HPLC method for obtaining reliable results, it is most important to find the optimal conditions for the analysis, the main of which is the choice of the mobile phase (the phase with the highest selectivity with respect to active substances), the column size, the type and size of the sorbent particles, the elution mode (gradient or isocratic mode), detection method (conditions), standard, etc. All this, of course, requires appropriate research using various reagents and solvents, as well as a waste of time. However, while reviewing the literature, we came across the HPLC technique [6] used to determine similar substances in a similar object. This circumstance prompted us to think about approbation of this technique for our case, in order to establish its suitability for determining amino acids in the liquid extract "Phlegmen" and, if necessary, modify it.

The object of the study was the sedative liquid extract "Phlegmen", obtained by the method of accelerated fractional maceration according to the counter flow principle (modified by VNIIF) using 70% ethyl alcohol as an extractant. The liquid extract obtained in this way is a transparent dark brown liquid with a greenish tint, with a characteristic odor and a weakly burning, icy taste [3,13].

Free amino acids in the "Phlegmen" liquid extract were analyzed using reversed-phase HPLC. Before chromatography, pre-column derivatization was performed using o-phthalic aldehyde as a derivatizing agent. An aliquot of the extract (100 μL) was mixed with 1 ml of the derivatization reaction mixture (1 ml of 0.1 M potassium borate solution pH 10.4, 20 μL

of methanol, 10 mg of o-phthalic aldehyde, 10 µL of 2-mercaptoethanol) and stirred for 3 min. The reaction was stopped by adding an equal volume of 0.1 M sodium acetate buffer, pH 6.0. The mixture was filtered through a filter with pores of 0.22 µm before being added to the column.

In parallel, a standard mixture of amino acids with a known concentration was derivatized in a similar manner. We used standard samples of the following amino acids: aspartic acid (asp), asparagine (asn), glutamic acid (glutamic acid), glutamine (gln), hydroxyproline (o-pro), serine (ser), glycine (gly), histidine (gis), arginine (arg), threonine (tre), alanine (ala), proline (pro), tyrosine (tyr), valine (val), lysine (lys), isoleucine (ile), leucine (lei), phenylalanine (phen), methionine (meth), cystine (cis) and cysteine (cis-cis). Then, before being introduced into the column, the mixture obtained after derivatization was filtered through a filter with pores of 0.22 µm.

Chromatography was carried out on an Agilent 1200 series liquid chromatograph from Agilent Technologies (USA) with Chemstation 09.03.a software, a pump, and a UV detector. Separation was performed on a 0.46x25 cm (4.6x250 mm) column filled with Zorbax XDB-C-18 sorbent. As a mobile phase, a solution of sodium acetate with a concentration of 2.72 g / L and pH 6.4 was used, containing 0.5% tetrahydrofuran (THF) - solution A and a solution of sodium acetate with a concentration of 2.72 g / L and pH 6, 4, containing 80% of a mixture of acetonitrile and methanol (1: 1) - solution B. Detection was carried out at a wavelength of 338 nm. The chromatography profile was monitored at 338 nm and 360 nm (for proline and histidine). Eluent flow rate 0.7 ml / min. The volume of the injected sample is 20 µl. Chromatography temperature (column thermostat) 40 C.

The suitability of the chromatographic system was verified by the efficiency of the chromatographic column, the degree of peak separation, and the relative standard deviation.

Chromatography of amino acids of the liquid extract "Phlegmen" and a standard mixture of amino acids with a known concentration was carried out sequentially under similar conditions. The results of chromatographic analysis of amino acids of the liquid extract "Phlegmen" are shown in Fig. 1.

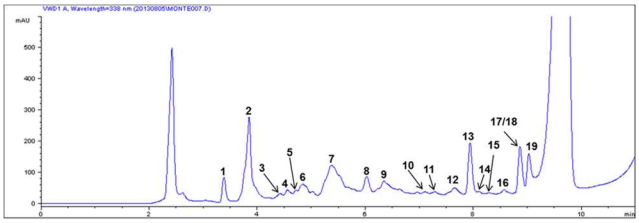

Figure: 1. Chromatogram of free amino acids of sedative collection "Phlegmen"

1 - aspartic acid, 2 - glutamic acid, 3 - asparagine. 4 - serine, 5 - glutamine, 6 - histidine, 7 - threonine, 8 - glycine, 9 - arginine, 10 - alanine, 11 - tryptophan, 12 - methionine, 13 - ammonia, 14 - tyrosine, 15 - valine, 16 - phenylalanine, 17 - isoleucine, 18-leucine, 19-lysine.

The identification and quantitative determination of amino acids contained in the test preparation was carried out by comparing the retention times and peak areas on the chromatogram of standard amino acids with those on the chromatogram of amino acids of the test preparation. Analysis of the obtained chromatograms of amino acids of the test sample and the standard mixture showed the presence of several amino acids in the liquid extract "Phlegmen". The results of the analysis indicating the names, chemical formula and amino acid content are presented in Table 1.

Table 1
The results of studying the amino acid composition of the sedative collection "Phlegmen"

Name of Amino acids	Chemical formula	Content µg/ml
1. Aspartic acid	$C_4H_7O_4N$	270
2. Glutamic acid	$C_5H_9O_2N$	880
3. Asparagine	$C_4H_8N_2O_3$	35
5. Glutamine	$C_3H_7O_3N$	128
6. Histidine	$C_5H_{10}N_2O_3$	28
7. Threonine *	$C_6H_9O_2N_3$	302
8. Glycine	$C_4H_9O_2N$	554
9. Arginine	$C_2H_5O_2N$	670
10. Alanine	$C_6H_{14}O_2N_4$	410
11. Tryptophan	$C_4H_8O_3N_2$	220
12 Methionine *	$C_{11}H_{12}N_2\ O_2$	420
13. Ammonia	$C_5H_{11}O_2NS$	117
14.Tyrosine * / 15 Valine *	NH_3	
16.Finylalanine *	$C_9H_{11}NO_3$ /$C_2H_5O_2N$	230
17.Isoleucine * / 18 Leucine *	$C_6H_9O_2N_3$	92
19. Lysine *	$C_4H_9O_2N$/ $C_6H_{13}O_2N$	720

*** Essential amino acids**

Peaks Tyr and Val; and also ile and Leu cannot be divided on this column, they are calculated together;

Calculation of Pro and His from the temple diagram at 360 nm; Cys is not detected.

The content of amino acids (X) in the liquid extract "Phlegmen" was calculated by the formula:

$$X = \frac{S_{РИО}\ x\ Cstd\ x\ P\ x\ FD}{S_{PCO}}$$

S_{RIO} - peak area of the corresponding amino acid in the chromatogram of the test sample;

C_{std} - is the concentration of a standard amino acid (µM / ml) in the PCO chromatogram;

P - calculation factor (Mm of amino acid) for converting data in µg / ml;

S_{PCO} - is the peak area of a standard amino acid in the PCO chromatogram;

FD - is the dilution factor.

According to the research, the liquid extract "Phlegmen" contains 18 amino acids and it indicates the high biological value of the sum of amino acids of the studied liquid extract. Among the amino acids in the collection, glutamic acid prevails, which is used in the treatment of diseases of the central nervous system. It follows from this that the amino acids of the liquid extract under study can participate in the manifestation of the pharmacological activity of the liquid extract.

Further research was aimed at studying the mineral composition of the liquid extract "Phlegmen".

Microelements have been known for a long time, but only recently have they received recognition as substances necessary for life. Microelements are “food, mainly for the endocrine glands,” more precisely, for enzymes since they have been catalysts of vital processes. While impacting on the body all microelements are interrelated and interdependent. Human needs for these "metals of life" are very individual. Minerals make up only 4% of the human body weight. Half of this amount is part of the hard parts of the body: bones, teeth, nails, hair, and soft tissues. The rest is in the blood, in the intercellular and intracellular fluid.

70-80% of our body weight is water and gases soluble in it - carbon, hydrogen, nitrogen and oxygen, and most of all in our body is oxygen - about 60% of the body weight, carbon - about 17%, hydrogen - about 10%, nitrogen - only 3% [3].

Micros - and macro elements control metabolic processes, maintain the physical and chemical integrity of cells and tissues by maintaining the characteristic bioelectric potentials. It is the microelements that play the main role in the activity of enzyme processes necessary for life. That is why their deficiency, as well as an excess, will immediately affect human health. It should be noted that the intercellular space contains mainly sodium and calcium, and inside the cells - potassium and magnesium. If the balance between them is disturbed, a person develops various diseases, accompanied by swelling. In this case, the balance should be maintained both between sodium and calcium, and between potassium and magnesium [2,12].

It should also be noted that the minerals contained in plants are divided into two groups: the first, called macronutrients, includes potassium, sodium, calcium, magnesium, manganese, silicon, chlorine, phosphorus; plant ash contains at least hundredths of a percent of these elements; the second, called trace elements, includes: iron, copper, zinc, iodine, barium, etc. Their content in ash is thousandths of a percent. The accumulation of microelements in plants is often selective: under the same soil conditions, different types of plants grow, and only some of them are capable of concentrating certain microelements [4,7,14].

Mineral substances are involved in metabolic processes of the body, are part of the protoplasm of cells, are present in intercellular and interstitial fluids, making them the necessary osmotic properties and creating a certain concentration of hydrogen ions for tissues. At present, microelements are of particular importance in the treatment of such serious diseases as blood diseases, malignant tumors and some others. Medicinal plants are of great interest in this regard, since when they are used in the form of total preparations, the therapeutic effect of the pharmacologically active substances contained in them can be successfully combined with the actions of microelements. It has been established that there is an interdependence between the accumulation of certain groups of physiologically active compounds in plants and the concentration of trace elements in them.

In many cases, the medicinal effect of plants is associated not with any one substance, but with a complex of substances included in it. Often, when using a pure active substance, it is not possible to obtain such an effect as when using the plant itself or a total preparation from its components (for example, when using valerian, rose hips, digitalis, etc.).

To study the elemental composition of the liquid extract "Phlegmen", an analytical sample with a mass of 1.0 ml was placed in a Teflon cup with a ground-in lid, 7 ml of 75% HNO3 was poured, and 3 ml of 30% H2O2 were added. Wet ashing was carried out in a microwave oven, Ethos DMicrowave Labstation, Milestone, with five-stage programming of the supplied microwave power from 0 to 600 W and changing the temperature of the reaction medium from 0 to 2250C. The sample was quantitatively transferred into a volumetric flask with a capacity of 100 ml and brought to the mark deionized water prepared by the MilliQ system. The resulting solution was directly analyzed by inductively coupled plasma mass spectrometry

on an ICP-MSAT 7500 device from Agilent Technologies. The analysis was performed in the Semiquant mode. In this case, the input power of the plasma is 1200 W, the speed of the peristaltic pump is 0.2 rpm, the speed of the carrier gas (argon-1 l / min) and gas plasma is 15 l / min. The research results are presented in Table 2.

Table 2
Elemental composition of the "Phlegmen" liquid extract

Elements	Content in µg	Content in %	Elements	Content in µg	Content in %
Li	0,0730	0,009	**As**	0,1470	0,019
Be	0,0200	0,0025	**Se**	0,033	0,0042
B	1,000	0,1275	**Br**	5,667	0,7232
Na	4,667	0,5955	**Sr**	2,33	0,2977
Mg	0,760	0,0978	**Mo**	0,1450	0,0185
Al	0,230	0,030	**Ag**	0,800	0,102
P	21,67	2,765	**Cd**	0,850	0,108
S	1,550	0,1978	**Sn**	0,0583	0,0073
Cl	71,67	9,15	**Sb**	0,03167	0,004
K	0,720	0,091	**Te**	<0,00780	0,00083
Ca	1,600	0,204	**I**	0,767	0,0978
Ti	2,33	0,298	**Ba**	1,667	0,213
V	0,078	0,0098	**W**	0,0250	0,0032
Cr	1,58	0,340	**Os**	<0,717	0,091
Mn	1,580	0,202	**Hg**	0,0550	0,007
Fe	0,400	0,051	**Tl**	0,0158	0,002
Co	0,068	0,0087	**Pb**	0,7167	0,0913
Ni	1,667	0,213	**Bi**	0,148	0,0189
Cu	1,250	0,1595	**U**	0,0620	0,0078
Zn	2,33	0,297			

As the data in Table 2 show, the liquid extract "Phlegmen" contains 39 elements. The vital elements are calcium, magnesium, potassium, sodium and chlorine, which are contained in the cell in the form of ions. The listed elements are included in the group of macronutrients. The largest quantities contain Macro elements in the liquid extract: chlorine, phosphorus, bromine, sodium, chromium, titanium, zinc.

Table 3 shows the average daily requirement of an adult for macronutrients and micronutrients in grams and milligrams.

Table 3
The daily requirement for macro and micronutrients of human

Macro elements		Microelements	
Chemical element	**gr**	**Chemical element**	**mg**
Potassium	1,1-3,3	Zinc	15
Sodium	1,9-5,6	Manganese	2-5
Calcium	0,8	Copper	2-3
Magnesium	0,35	Cobalt	Следы
Chlorine	1,7-5,1	Chromium	0,05-0,2
Phosphorus	0,8	Molybdenum	0,15-0,5

Sulfur	0,2	Selenium	0,05-0,2
Iron	10	Iodine	0,15

Also it can be seen from table 2 that there were found such elements in the liquid extract "Phlegmen" that are involved in sedative activity. One of the main microelements in the human body is calcium. The liquid extract contains 0.204% of this element. It is the main element in our skeletal system. If there is not enough calcium, a person feels nervousness, irritability, and insomnia. Blood pressure, depression, and heart palpitations increase [6].

The macronutrient calcium is necessary for performing structural functions, being a part of the human skeleton, teeth and other tissues, for ensuring metabolism in tissues, maintaining normal throughput of blood vessel walls, for normal muscle function, for blood coagulation processes, for regulating blood pressure and cholesterol levels, for normal kidney function, for the transmission of nerve impulses. When it is deficient, muscle cramps, softening of the bones (osteomalacia), osteoporosis, or decreased bone density occur.

Vitamin D primarily contributes to calcium absorption, but fats, magnesium and other nutrients also play a role.

The macronutrient potassium is needed, first of all, for the transmission of nerve impulses, for maintaining the acid-base balance of the blood, for normal carbohydrate metabolism, for ensuring muscle contraction. Its need increases primarily with vomiting and prolonged diarrhea, with profuse sweating, with taking diuretics, with increased excretion of potassium in the urine, which can be caused, as well as excessive amounts of sodium, coffee, sugar and/or alcohol consumed, or low sugar levels in blood. Potassium is a very common mineral found in many foods. The best sources of potassium are plant foods, especially dried fruits and berries, nuts, seeds, Jerusalem artichoke, potatoes, radishes, cabbage, green vegetables, oatmeal, beets, bananas, breads, currants, and tomatoes. The symptoms of potassium deficiency are muscle weakness, heart problems, and mental health problems. Low potassium intake can lead to sodium retention and high blood pressure. A diet rich in potassium has been linked to beneficial effects on cardiovascular health.

The macronutrient sodium is primarily needed for normal water exchange between blood cells and tissues, to maintain the acid-base balance in the body, to transmit nerve impulses, to ensure muscle contraction.

Diet-related sodium deficiency usually does not occur. Acute deficiency can occur with profuse sweating in combination with the consumption of large amounts of non-sodium fluids, or as a result of vomiting and diarrhea. Symptoms include muscle cramps, lack of appetite, and malabsorption of nutrients. Severe sodium deficiency can lead to coma and death. Excessive consumption of this macronutrient loads the kidneys, causes edema (normal water exchange between blood cells and tissues is disrupted), can cause an increase in blood pressure, leads to excessive excretion of water and potassium in the urine (which, however, does not relieve edema).

For adult men and women, no difference is made in the recommended maximum daily sodium intake, it should not exceed 6 grams of salt (i.e. about 2400 mg of sodium, including contained in annual food such as bread, meat products, cheese etc.). In some cases (for example, with high physical activity, increased sweating), the need for salt may be higher. The

physiological minimum of sodium for an average adult is 1.5–2 grams per day. For children under 2 years old, food saturation with sodium, expressed in the amount of salt, more than 2.1 grams (i.e. about 830 mg of sodium) per 1000 kcal of food energy is not allowed. From the second to the tenth year of life, salt should not be consumed more than 3-4 grams per day (1190-1580 mg of sodium).

A lack of magnesium leads to anxiety, fear, confusion, depression. Also, hyperactivity, nervousness, shifting from foot to foot, jumping gait, sharpness of movements are observed. Loss of balance, dizziness, fainting, weakness in the arms and legs, abnormal blood pressure, cold extremities. The trace element magnesium promotes the absorption of calcium. A magnesium deficiency, even if not too severe, can be a cause of heart disease. A serious deficiency of this mineral leads to harmful consequences - as a rule, to heart attacks. The magnesium content in the liquid extract is 0.0978%.

Phosphorus and bromine have a pronounced sedative effect and have a beneficial effect on the nervous tissue, restoring performance after emotional and physical exertion [2,11,12]. Bromine is involved in the regulation of the thyroid gland, as it is a competitive inhibitor of iodine. Lack of bromine in food leads to insomnia, growth retardation and a decrease in the number of red blood cells in the blood [2,11]. The phosphorus content in the liquid extract is 2.765%, and the bromine content is 0.7232%.

Iodine is essential for the synthesis of the thyroid hormone thyroxine, as well as for the creation of phagocytes - patrol cells in the blood that must destroy debris and foreign bodies. Phagocytes capture and digest microorganisms, defective cells. Lack of iodine contributes to the development of Graves' disease (goiter). Children and adolescents require more iodine than adults. Iodine is used for atherosclerosis, treatment of syphilis in the tertiary period, inflammatory processes of the respiratory tract, chronic mercury and lead poisoning, for the prevention and treatment of goiter [2,11]. Potassium iodide is prescribed for breast mastopathy and other neoplasms in the endocrine glands. Iodine has a sedative (calming) effect on a person, increases mental capacity. The iodine content in the liquid extract is 0.0978%.

Lithium prevents the development of neuropsychic diseases and has a positive effect on the treatment of schizophrenia [2,11,12]. Zinc deficiency is of paramount importance, since it not only leads to underdevelopment of the nervous and reproductive systems, but is also deeply associated with problems of immunodeficiency. T-lymphocytes in conditions of zinc deficiency are inactive. Lithium in the liquid extract contains 0.009%.

CONCLUSION

Thus, as a result of the research carried out, the amino acid and elemental composition of the liquid extract "Phlegmen" was determined, and it was found that the extract contains 18 amino acids and 39 macro and micro elements. Among the amino acids in the collection, glutamic acid prevails, which is used in the treatment of diseases of the central nervous system. Among the macronutrients, such elements as lithium, calcium, phosphorus, iodine, magnesium, bromine were found, which have a pronounced sedative effect and have a beneficial effect on the nervous tissue, restoring performance after emotional and physical exertion. The data obtained allow us to conclude that the amino acid

and elemental composition of the liquid extract is very diverse and, accordingly, can have a complex effect.

CONFLICT OF INTERESTS AND CONTRIBUTION OF AUTHORS

The authors declare the absence of obvious and potential conflicts of interest related to the publication of this article and report on the contribution of each author.

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