

# Investigation Of The Content Of Chemical Elements In Leoflomis Dry Extract

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## ARTICLE INFO

## ABSTRACT

The article presents data on the study of the elemental composition of the dry extract "Leoflomis" obtained from the herb Regel's zopnik (*Phlomis regelii* M. Pop.) and Turkestan motherwort (*Leonurus turkestanicus* L.), which has a sedative effect. For the first time, qualitative and quantitative analysis of macro- and microelements in Leoflomis dry extract was carried out using a highly sensitive multi-element analysis method - mass spectral with inductively coupled plasma. The quantitative content of mineral substances has been determined. Iron, boron, zinc and copper were found in predominant amounts among the trace elements, while potassium, magnesium, calcium, phosphorus and sodium prevailed among the macronutrients.

**Keywords:** dry extract, herb of Regel's zopnik and Turkistan's pustyrnik, macro- and microelements, mass spectrometry.

## INTRODUCTION

The constancy of the chemical composition of the human body is one of the most important and mandatory conditions for its normal functioning. Minerals serve as a catalyst for biochemical reactions in the body and a building material for the skeleton. They are not synthesized in the body, and their reserves are small. Mineral elements do not have nutritional value, but they are needed by the body as substances involved in the regulation of metabolism, in maintaining osmotic pressure, to ensure the constancy of the pH of the intra- and extracellular body fluids. Many mineral elements are structural components of enzymes and vitamins. As is known, the peculiarities of mineral metabolism have an obvious effect on the state of health, the prevalence of certain diseases and pre-painful conditions in general; the participation of basic trace elements in the formation of reactions of protection against stress, infections and neoplasms is also undoubted. Therefore, correction of deviations in the exchange of macro- and microelements is a promising area of modern medicine, which can significantly improve the health indicators of the population [1, 2]. In recent decades, much attention has been paid to the study of the trace element composition of medicinal plants and phytopreparations, which is important, at least in relation to two positions. Firstly, the elemental chemical composition of a plant growing in a certain territory, or extracts obtained from it, can be considered as a kind of reflection of the biogeochemical and ecological situation in this region, characterizing the ecological purity of the harvested medicinal raw materials. Secondly, the action of the main biologically active substances contained in phytopreparations is often manifested in combination with the action of macro- and microelements that determine the natural mineral composition of each plant [3,4]. One of the promising plants on the basis of which the possibility of creating potential preparations of plant origin containing a complex of biologically active substances (BAS) can be the grass Regel's zopnik (*Phlomis regelii* M. Pop.) and Turkestan motherwort (*Leonurus turkestanicus* L.) growing on the territory of the Republic of Uzbekistan, in particular in the Tashkent, Samarkand and Surkhandarya regions [5]. Previously conducted technological and pharmacological studies have shown the expediency of developing a technology for obtaining a dry extract from the above medicinal herbs, focused on the active groups of BAS- flavanoids, which cause its sedative effect [3,4,5]. At the same time, scientific data on studies of the mineral composition in the dry extract "Leoflomis" are missing. Considering the above, it became necessary to study the chemical composition of the dry extract "Leoflomis" in relation to the presence of minerals. The purpose of this work was to study the mineral composition of the dry extract "Leoflomis" obtained from the herb Regel's zopnik

(*Phlomis regelii* M. Pop.) and Turkestan motherwort (*Leonurus turkestanicus* L.), which has a sedative effect and meets the requirements of GF XIV.

## MATERIALS AND METHODS

The dry extract "Leoflomis" obtained by maceration was used as the material for the study. Quantitative determination of chemical elements was carried out by inductively coupled plasma mass spectrometry ICP-MSAT 7500 from Agilent Technologies (USA). The studied samples were analyzed in Semiquant mode. Wet salting was carried out in a microwave oven - "Ethos DMicrowave Labstation" manufactured by Milestone (Italy). The temperature of the reaction medium was from 0 to 2250C, with a power from 0 to 600 watts. The analysis was studied using a peristaltic pump velocity of 0.2 rpm, while the velocity of the argon carrier gas was 1 l/min and the gas plasma was 15 l/min [6,7]. The test for determination in the Semiquant mode with an input plasma power of 1200 watts.

## RESULTS AND DISCUSSIONS

The results of studying the macro- and microelement composition in various samples of Leoflomis dry extract obtained by mass spectrometry are presented in Table 1.

**Table 1 The results of determining the number of elements contained in the dry extract "Leoflomis"**

Nº	Elements	Determination results, mg/kg	Nº	Elements	Determination results, mg/kg
1	Ge – Germany	0,001	15	Re – rhenium	0,000
2	Se – selenium	0,060	16	Tl – thallium	0,001
3	Rb - rubidium	1,709	17	Ti – titanium	2,456
4	Sr – strontium	0,200	18	V – vannady	0,117
5	Zr – zirconium	0,020	19	Cr – chrome	0,865
6	Nb – niobium	0,001	20	Mp – manganese	5,133
7	Mo – molybdenum	0,081	21	Ni - nickel	0,813
8	Ad - kumush	0,393	22	Ga - gallium	0,313
9	Fe* - temir	<b>222,567</b>	23	Li - lithium	0,783
10	In – India	0,000	24	Be - beryllium	0,026
11	Sn – tin	0,202	25	B* - boron	<b>11,806</b>
12	Ba – barium	0,505	26	Cs - Caesium	0,004
13	Ta - tantalum	0,000	27	Cu* - mis	<b>1,785</b>
14	W - Wolfram	0,091	28	Zn* - zinc	<b>4,036</b>

As the data in Table 1 show, Leoflomis dry extract contains 36 elements. The high content of elements important for the vital activity of the body, such as sodium, magnesium, phosphorus, potassium and calcium, which is direct evidence of the high pharmacological activity of the tested extract. The next step was the determination of macronutrients in the Leoflomis dry extract. The results obtained are shown in Table 2.

**Table 2 Results of determination of macronutrients in Leoflomis dry extract**

Nº	Elements	Determination results, mg/kg
1.	Na* - sodium	1855,206
2.	Md* - magnesium	4816,204
3.	Al - aluminum	48,372
4.	Si - silicium	795,502
5.	P* - phosphorus	1947,167
6.	S - oltingugurt	818,865
7.	K* - potassium	28224,121
8.	Ca* - calcium	4019,931

As can be seen from Table 2, iron, boron, copper and zinc are found in the largest amounts of trace elements, which are non-replaceable nutrients. The amount of heavy metals in the Leoflomis dry extract was also studied, which are shown in the table 3.

**Table 3 The results of the study of heavy metals in Leoflomis dry extract**

<b>№</b>	<b>Elements</b>	<b>Determination results, mg/kg</b>
1.	Pb	0,043
2.	Hg	0,077
3.	Cd	0,009
4.	Cu	1,785
5.	Zn	4,036
6.	As	0,000
7.	Sb	0,003
The total number of 5,953 = 0,0005953%		

As can be seen from Table 3, the content of heavy metals does not exceed the permissible norm and is 0.0005953%. It can be seen from Tables 1 and 2 that in the dry extract of sedative action "Leoflomis" such elements were found that enhance the processes of inhibition in the cerebral cortex and participate in sedative activity. The calcium content in the dry extract was 4019.931 mg/ml. If there is a deficiency of this element in the human body, a person experiences depression, palpitations, increased blood pressure, as well as nervousness, irritation and insomnia [8]. The content of sodium in the dry extract, which amounted to 1855.206 mg/ml, ensures proper brain function. The macronutrient contributes to the functioning of the brain. A decrease in the daily dose of sodium can provoke an attack of dizziness, in rare cases, lethargic seizures are possible. In addition, reducing sodium intake can lead to confusion [9].

The element magnesium in the dry extract contains 4816.204 mg/ml, it is one of the main elements for our health, which is involved in about 300 processes of regulation and metabolism. Magnesium participates in the synthesis of neurotransmitters (endorphins, catecholamines, neuropeptides), provides antioxidant protection of neurons. Therefore, it can be called a nervous system adjuster, since it regulates emotionality, mood, and is responsible for normal sleep and performance. Copper is also needed to create connective tissue and produce melanin [9, 10]. This element contains 1,785mg/ml in a dry sedative extract.

The above data indicate the value of the analyzed dry extract "Leoflomis" as a source of macro- and microelements. At the same time, the content of heavy metals lead, cadmium, mercury and arsenic in the Leoflomis dry extract did not exceed the permissible values given in GF XIV [11].

## CONCLUSION

The elemental composition of the sedative-acting Leoflomis dry extract was first studied by ICP-MS mass spectrometry, which revealed the content of 36 elements. Such vital elements as sodium, magnesium, phosphorus, potassium and calcium have been found, which are involved in regulating the emotional state of a person, responsible for normal sleep and performance. Of the trace elements, iron, boron, copper and zinc are found in the largest amounts, which have a pronounced sedative effect. The obtained data allow us to conclude that the elemental composition of the dry extract "Leoflomis" is very diverse and, accordingly, can have a complex effect. At the same time, the content of arsenic and heavy metals does not exceed the regulated norm allowed for dry extracts, which indicates the ecological purity and safe use of dry extract in medical practice.

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