Western European Journal of Medicine and Medical Science
Volume 2, Issue 8, August, 2024
https://westerneuropeanstudies.com/index.php/3
ISSN (E): 2942-1918 Open Access| Peer Reviewed

STUDY OF THE ELEMENTAL COMPOSITION OF THE AERIAL PART OF THE MEDICINAL PLANT POLPALA

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The paper presents the results of research work on the study of the elemental composition of the plant polpala (Aerva lanata (L.) Juss.), collected in the Namangan region. For this purpose, the mass spectral method of inductively coupled plasma was used. It has been established that the amount of elements such as sodium, nickel, magnesium, iron, cobalt, cadmium, and chromium in the plant is relatively high. Among the macroelements, the element calcium had the highest indicator (13.24%).
Key words: plant polpala (Aerva lanata (L.) Juss.), elemental composition, mass spectral method of inductively coupled plasma, microelements, macroelements.

Introduction. In folk medicine, the aerial parts of the "polpala" are used medicinally as a diuretic. Its tincture is used in the treatment of kidney and urinary tract diseases, and colds of the prostate gland. The herb tincture is used to dissolve kidney stones, treat complications of kidney colds, and remove worms and various helminths from the body [1].

Today this plant is officially included in the list of medicinal herbal raw materials. Preferably its aerial part is used, which contains the maximum concentration of biologically active compounds that have a positive effect on the body and have healing effects. According to biochemical analysis, therapeutic and prophylactic effects are achieved due to the presence of the following components in the plant: ervopanin, ervoside, organic acids, phenolic compounds, pectin, alkaloids from the indoles group, bitterness, oleanoic acid, glycosides, triterpenes.

Due to the complex of biologically active compounds, polpala, or ervy woolly, has a number of positive properties for the body, helping to replenish minerals and vitamins, positively affecting the functioning of the circulatory system. According to research, all components in the plant are present in sufficiently high quantities to exhibit therapeutic and preventive effects. With regard to the elemental composition of plants, as is known, plants, by absorbing chemical elements from the soil, soil-forming rocks, groundwater and atmosphere, act as an active source of biogenic migration of chemical elements in nature. Plants accumulate a large set of elements, many of which play an important role in plant metabolism. In this regard, the problem of studying the mineral composition of raw materials and herbal medicines based on them is important for the characteristics of medicinal plants [2,3].

Purpose of the study. The purpose of our research is to study the micro and macroelement composition of the above-ground part of the polpala plant growing in Uzbekistan. It is known that the human body contains 22 elements from inorganic substances, including: Ca, O, P, Na, Mg, S, B, Cl, K, N, Mn, Fe, Co, Ni, Cu, Si, J , F, Se, Br. Based on this, the goal was to study the elemental composition of the polpala plant using the inductively coupled plasma mass spectrometry (ICP-OES) method.

Materials and methods. The following devices and reagents were used for the analysis: Avio-200 mass spectrometer (ICP-OES) from Perkin Elmer, Berghof microwave oven (Speed Wave Xpert), Teflon autoclaves, volumetric flasks, OES multi-element standard, rare metal OES

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multi-element standard, Hg standard (mercury), nitric acid (reagent grade), hydrogen peroxide (reagent grade), deionized water, argon (purity 99.995%) [4, 5].

On an analytical balance, 0.1000 g of the test sample (crushed parts of the plant) is weighed and placed in a Teflon container in an autoclave, then filled with 7 ml of a 75% nitric acid solution and 2 ml of a 30% hydrogen peroxide solution. The autoclave is closed and installed in a Berghof programmable microwave chopper (Speed Wave Xpert). The process is carried out using a special interface device program. After decomposition of the substances placed in the autoclave, the autoclaves are cooled to room temperature, the contents of the liquid are quantitatively poured into a flask with a capacity of 100 ml. After this, the autoclaves are washed 2-3 times and added to the liquid in the flask, then filled with bi-distilled water to the flask mark, poured into a test tube and placed in an autosampler under a certain number. The solution after mineralization is analyzed on an Avio-200 inductively coupled plasma optical emission spectrometer (ICP-OES) from Perkin Elmer. Process information is monitored by a liquid crystal display. The analysis is carried out by the method of wet mineralization for 35-45 minutes under conditions of a minimum temperature T -500C and a maximum temperature T 2300C, pressure R [bar] max 40 [bar] inside autoclaves.

Results and discussion. As a result of studying the elemental composition of the crushed aerial part of the plant by emission spectral analysis using an inductively coupled plasma mass spectrometer, 19 elements were identified. Among these elements, calcium, magnesium, sodium and chlorine ions enter the cell and are vital for the normal functioning of the human body. Their cellular content is calculated in tenths and hundredths of a percent. The largest quantities of macroelements such as sodium, nickel, magnesium, iron, cobalt, cadmium, and relatively high chromium were found in the crushed aerial part of the plant. Among the macroelements, the element calcium had the highest indicator (13.24%).

Conclusions. As a result of studying the micro and macroelement composition of the above-ground part of the plant, the following were found in significant quantities: Ca, Mg, Na, Fe, Mn, Cu, Ni, Cr, Co, among which calcium (Ca) is a cofactor of many enzymes necessary for blood clotting processes, muscle function, and is also the main component of the elements of bones and teeth. Magnesium, in turn, participates in protein biosynthesis, in the functioning of smooth muscles, and inhibits excitation processes in the central nervous system (4.5). The quantitative composition of the above-ground part of the plant has the following indicators: calcium content is 10590 mg/kg, magnesium - 1908 mg/kg, sodium - 1759 mg/kg, iron 1143 mg/kg (See table).

Table

Elemental composition of the above-ground part of the plant

Element	Quantity (mg/kg)	Quantity, (%)	Element	Quantity (mg/kg)	Quantity (mg/kg)
Ca	**10590**	13,24	**Mg**	1908	0,49
Se	<1,345	0,247	**Cr**	9,676	0,37
Ba	1,640	0,104	**Cu**	52,78	0,018
Ag	<1,885	0,35	**Sr**	1, 476	0,013
Al	<5,415	0,115	**As**	0,0008	0,004
Mn	63,29	0,041	**Cd**	0,0743	0,292
Fe	1143	0,48	**Pb**	0, 0353	0,014

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Co	1,014	0,369	**Hg**	0, 0104	0,017
Ni	51,43	0,980	**Zn**	<1,816	0,174
Na	1759	0,890			

Conclusions. For the first time, a quantitative analysis of the composition of macro- and microelements necessary for humans in the above-ground parts of plant polpala has been studied. Based on the results of the analysis, it was found that the amount of elements such as Ca, Mg, Na, Fe, Mn, Cu, Ni, Cr, Co in the plant composition is relatively high. Among the macroelements, the element calcium had the highest indicator (13.24%). Elements such as sodium, nickel, magnesium and iron took place in quantity after calcium. Calcium (Ca) is a cofactor for many enzymes necessary for blood clotting, muscle function, and is also a major constituent of bones and teeth. Magnesium, in turn, participates in protein biosynthesis, in the work of smooth muscles, and inhibits excitation processes in the central nervous system [5,6].

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