International Journal of Scientific Trends- (IJST)
ISSN: 2980-4299
Volume 2, Issue 5, May, 2023
Website: https://scientifictrends.org/index.php/ijst
Open Access, Peer Reviewed, Scientific Journal

Evaluation of the Medicinal Properties of the "Gulkhairi" Plant Used in the Treatment of Respiratory Tract Diseases By Its Chemical Composition

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Abstract:
The article provides information on the importance of vitamins used in the treatment of respiratory diseases, the determination of the amount of water-soluble vitamins in the extract of Althea root and vegetative organs in a 0,1 N hydrochloric acid solution using the "High-Performance Liquid Chromatography" method.

Keywords: drug treatment for respiratory diseases, water-soluble vitamins, Altea root, Altea autonomic organs, ointments, compresses, nutritional supplements and creams, traditional and scientific medicine..

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INTRODUCTION

Acute respiratory diseases play a very important role in the increase of respiratory diseases. Acute respiratory diseases are among the infectious diseases that occur in humans and take the leading place among them [1].

Any viral infection is transmitted from the patient through the respiratory route (when talking, sneezing, and coughing). Disease-causing viruses enter the upper respiratory tract (nose, larynx), enter the cells of the outer layer of the mucous membrane (epithelium), destroy them and some of the pathogens die, release toxic substances and poison the body [2].

The granulosa cells that store the virus migrate, and when the patient talks, coughs, or sneezes, they fall into the air with saliva, nasal mucus, and sputum, and infect others. The disease can also be transmitted from household items, i.e. dishes, towels, and toys. Acute respiratory diseases can conditionally be called seasonal diseases, because this group of diseases is more common in late autumn and winter [3].

Althea officilanis roots contain about 35% mucilage, 37% starch, 10.2% sucrose, aspartic acid, 4% betaine, 17% fat and other substances. The leaves and flowers contain about 0.02% solid essential oils [4].

The healing effect of cauliflower is due to its mucilage and pectin substances. The mucous substance is mainly polysaccharides, disaccharides, pentoses, and consists of galactose, pentose and dextrose-forming hexoses[5].

In addition, the composition of the flowering plant contains malic acid, essential oil, rubbery substance, steroids, tannins, betaine, fats, vitamin C, and vitamin B, as well as organic substances such as flavonoid glycosides, coumarins, phenol [6].

In addition, cauliflower root also contains 37% starch, up to 2% asparagine, 8% sucrose, 11-16% pectin, 1.7% oils, betaine, carotene, phytosterols, minerals, uronic acid, and several mineral salts. Gulkhairi seeds contain lauric acid, β-sitosterol, lanosterol, altehexacosanyl lactone, altekamine, altecoumarin glycosides [7].

A certain amount of vitamins is necessary for the proper functioning of the human body. With respiratory diseases, the right complex of vitamins helps to alleviate the symptoms of the disease and is also useful for the prevention of respiratory diseases. All trace elements do not affect the circulatory system. Therefore, we should focus on the most important vitamins for respiratory diseases. In order for the body to fully assimilate micronutrients, the human body must have enough vitamin C [8].

Experimental Part

Used reagents and equipment. Vitamin B_{12} was obtained from "Rhydburg Pharmaceuticals" (Germany), and vitamins B_1, B_2, B_6, B_9 and C from "DSM Nutritional Products GmbH" (Germany). HPLC-grade water, acetonitrile, chemically pure-grade acetic acid and sodium hydroxide reagents were used.

Quantification of water-soluble vitamins in the plant was carried out on an LC-40 Nexera Lite high-performance liquid chromatograph manufactured by Shimadzu, Japan.

Preparation of standard solutions. Solutions of vitamins C (CAS 50–81–7), B_1 (CAS 70–16–6), B_6 (CAS 65–23–6) and B_{12} (CAS 68–19–9) (100 mg/l) of each vitamin It is prepared by

dissolving 5 mg in 50 ml of HPLC grade water. Standard solutions of vitamins B_2 (CAS 83-88-5) and B_9 (CAS 59-30-3) were prepared by dissolving 5 mg of these vitamins in 50 ml of 0.025% sodium hydroxide solution. Then all the B vitamins were mixed together and a total solution was prepared. (the stock solution was stored in sealed brown vials at -18 ℃ to prevent decomposition. Working standards of these vitamins at 5, 10, 15, 20 mg/L were prepared by diluting the stock solution.

Preparation of plant extract. For the extraction of water-soluble vitamins, 2 g of the tested sample was weighed with an accuracy of 0.01 g on a scale manufactured by OHAUS Company (USA) NV222, placed in a 100 ml conical flask, and 50 ml of 0.1 N HCl solution was added. The mixture was extracted in an ultrasonic bath of GT SONIC-D3 (China) at a temperature of 60 ℃ for 20 minutes. The mixture was then cooled, filtered and made up to 100 mL with water in a volumetric flask. 1.5 ml of the extract was filtered through a 0.45 μm syringe filter and placed in a vial and used for analysis.

Chromatographic conditions. Identification of vitamin B group. Standard solutions and sample extracts LC-40 Nexera Lite high-performance liquid chromatograph consisting of LC-40D pump, SIL-40 autosampler, SPD-M40 photo-diode array detector (PDA) and LabSolutions ver. 6.92 software was analyzed. Shim pack GIST C18 (150 × 4.6 mm; 5 μm, Shimadzu, Japan) reverse-phase column and a gradient mobile phase consisting of acetonitrile (A) and a 0.5% solution of acetic acid in water (B) (Table 1) was used. The injection volume was set at 10 μL, the flow rate at 0.9 mL/min, and the column thermostat temperature at 35 °C. The analytical signal (peak area) of each vitamin was recorded at four wavelengths 361, 291, 265 and 247 nm (Figures 1-4).

Determination of vitamin C. Standard solution and sample extract Shim pack GIST C18 (150 × 4.6 mm; 5 μm, Shimadzu, Japan) reversed-phase column and an isocritical mobile phase consisting of a 0.5% solution of acetic acid in water were used. The injection volume was 10 μl, the flow rate was 0.9 ml/min, and the column thermostat was set to room temperature. The analytical signal (peak area) of vitamin C was recorded at 244 nm (Figures 1-, 2-, 3-, 4- and 5).

Table 1. Mobile phase gradient software

Time	*Acetonitrile (A), %*	*0.5% acetic acid (B), %*
0	0	100
0.76	0	100
2.26	17	83
5.26	17	83
5.32	0	100
11	Termination	

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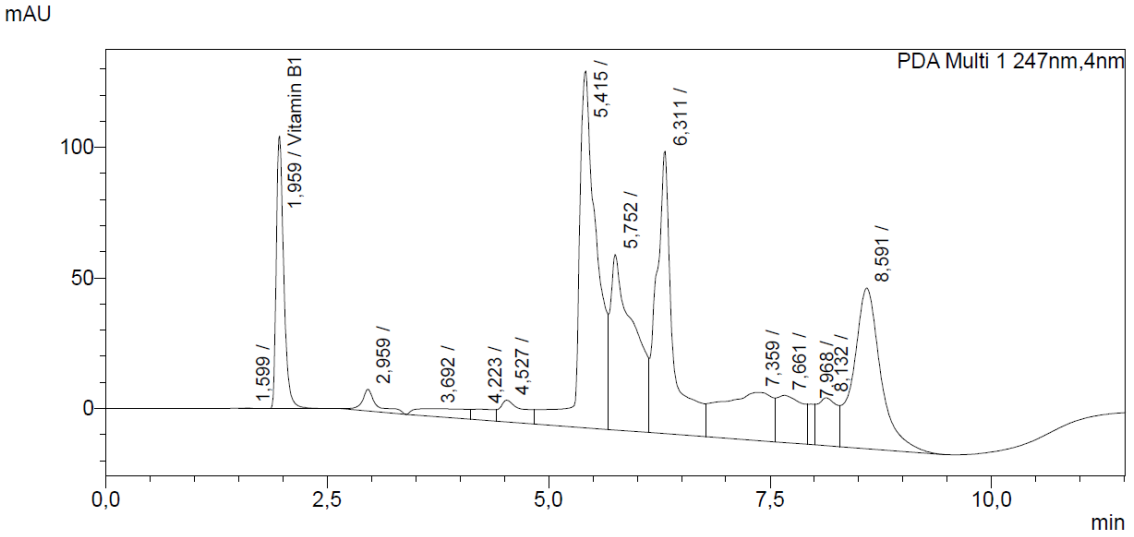

Figure 1. Chromatogram at 247 nm of vitamin B_1 standard solution.

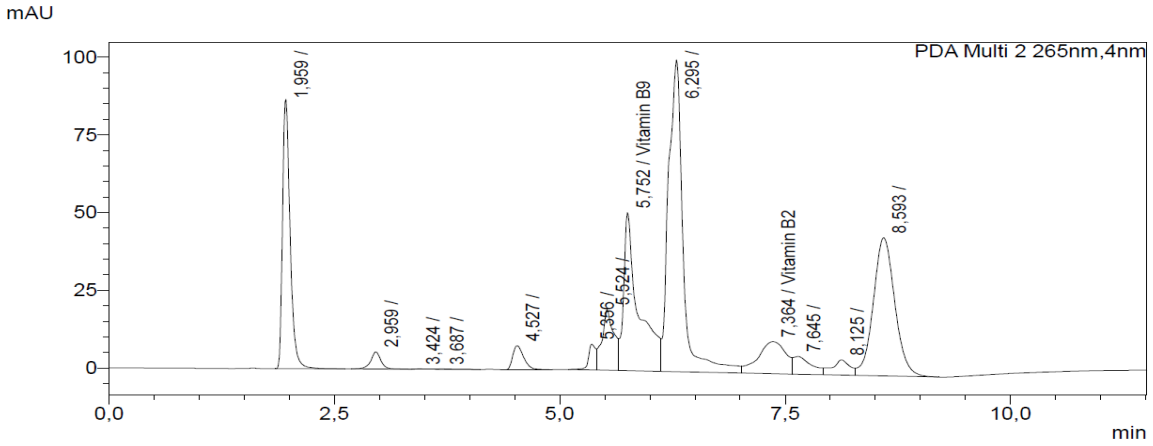

Figure 2. Chromatogram at 265 nm of standard solutions of vitamins B_2 and B_9.

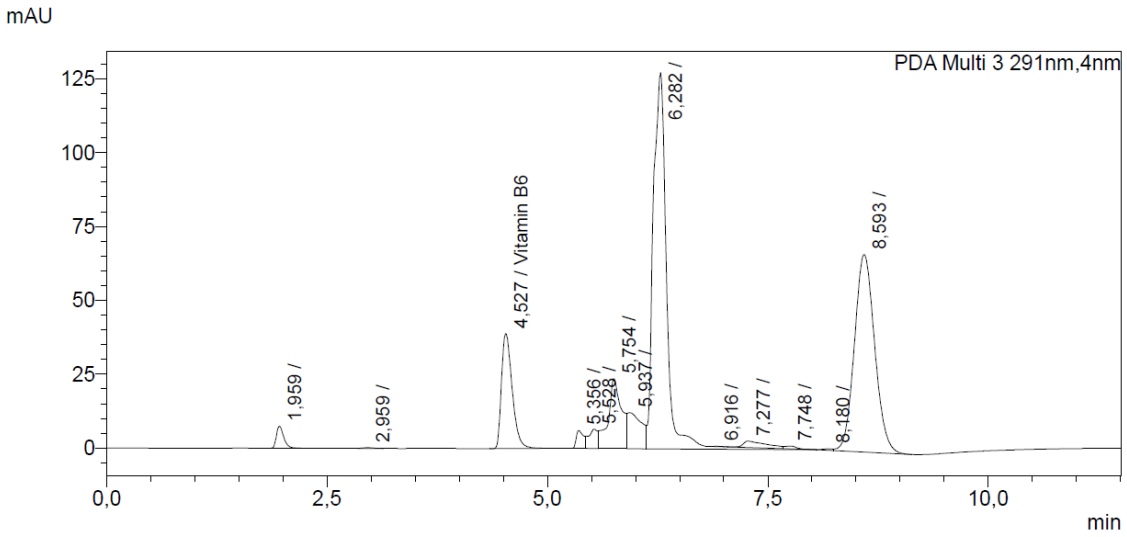

Figure 3. Chromatogram of vitamin B_6 standard solution at 291 nm.

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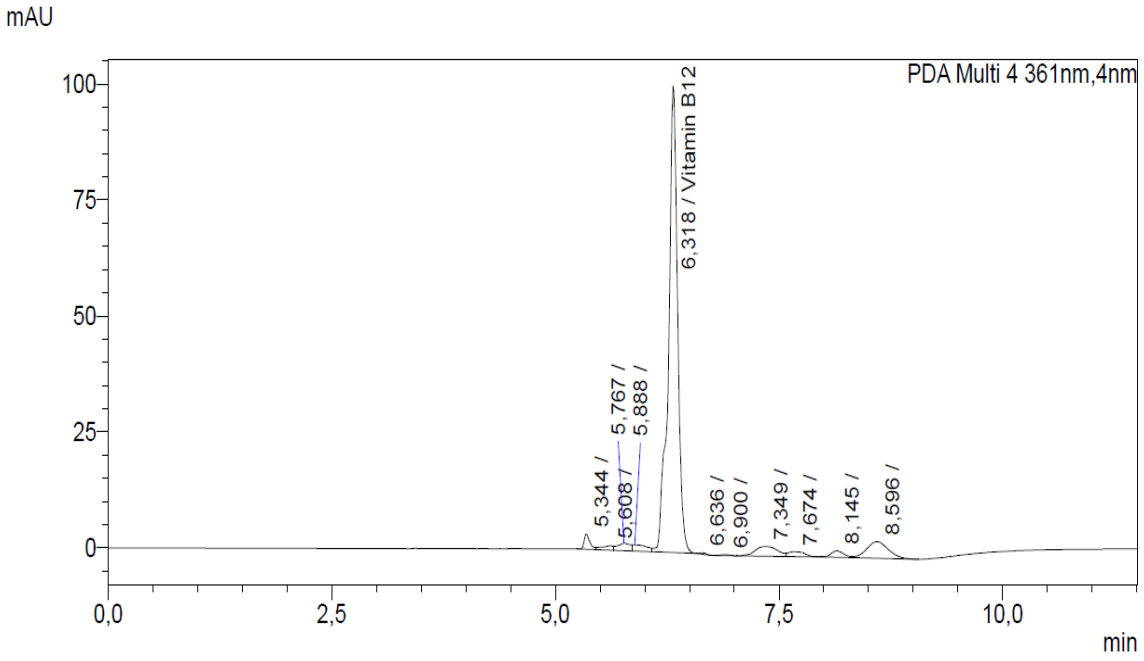

Figure 4. Chromatogram of vitamin B_{12} standard solution at 361 nm.

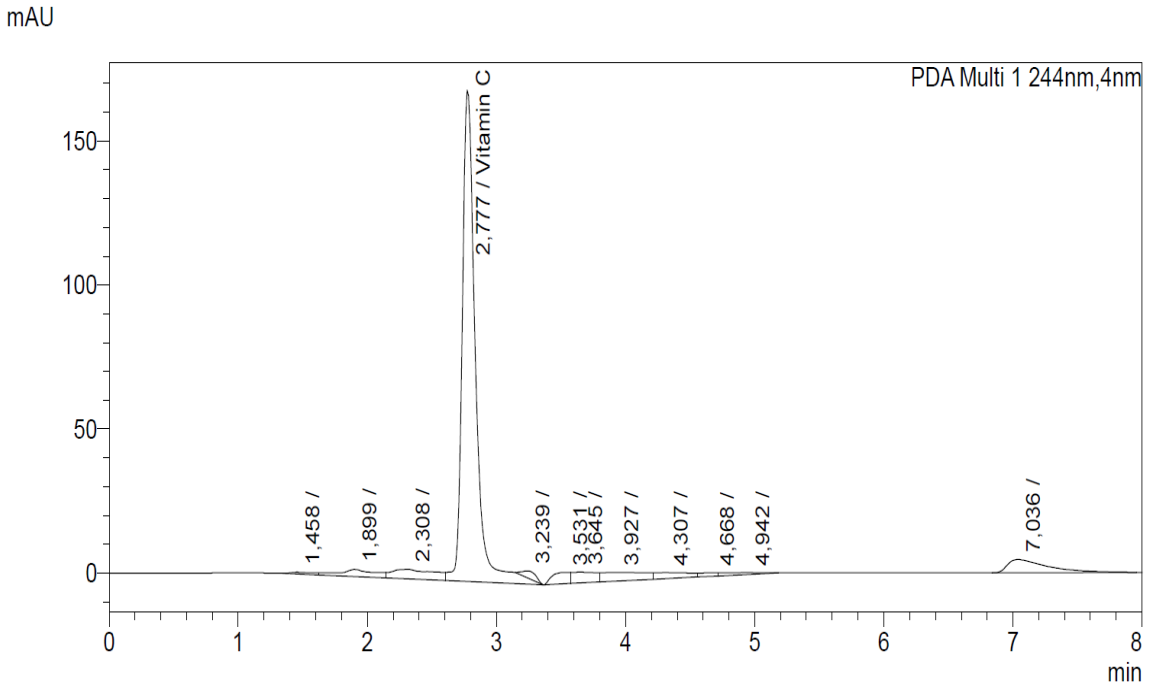

Figure 5. Chromatogram of vitamin C standard solution at 244 nm.

Results and Discussion

The amount of water-soluble vitamins contained in the extracts of cauliflower root and vegetative organs in 0.1 N hydrochloric acid was determined by the HPLC (High-Performance Liquid Chromatography) method. A chromatogram of the extract of the tested sample in 0.1 N HCl was obtained (Fig. 6) and the results were processed and presented in Table 2.

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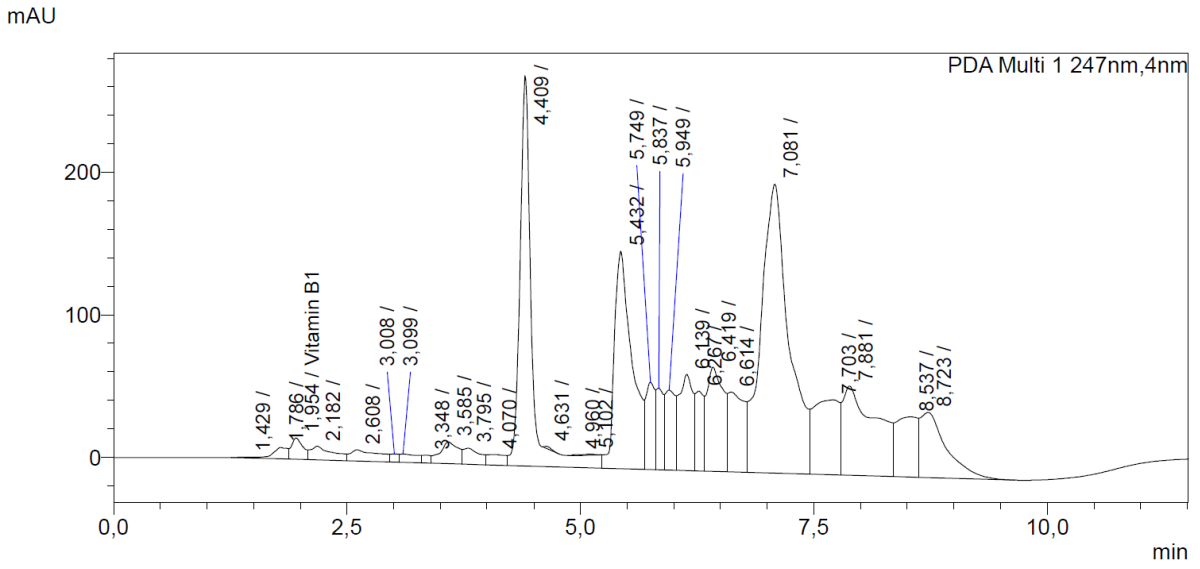

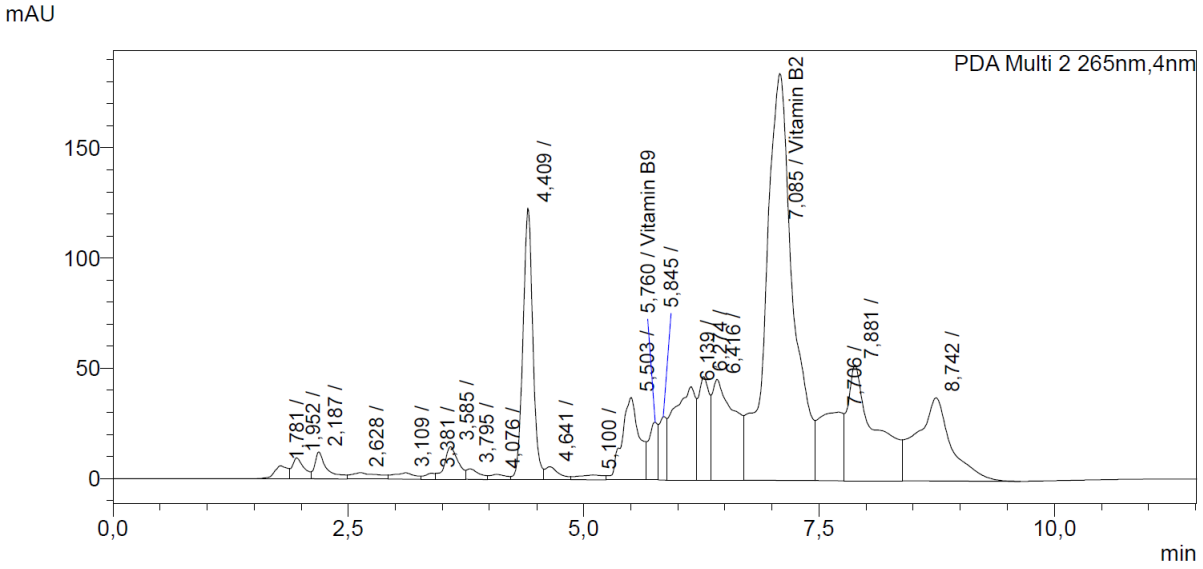

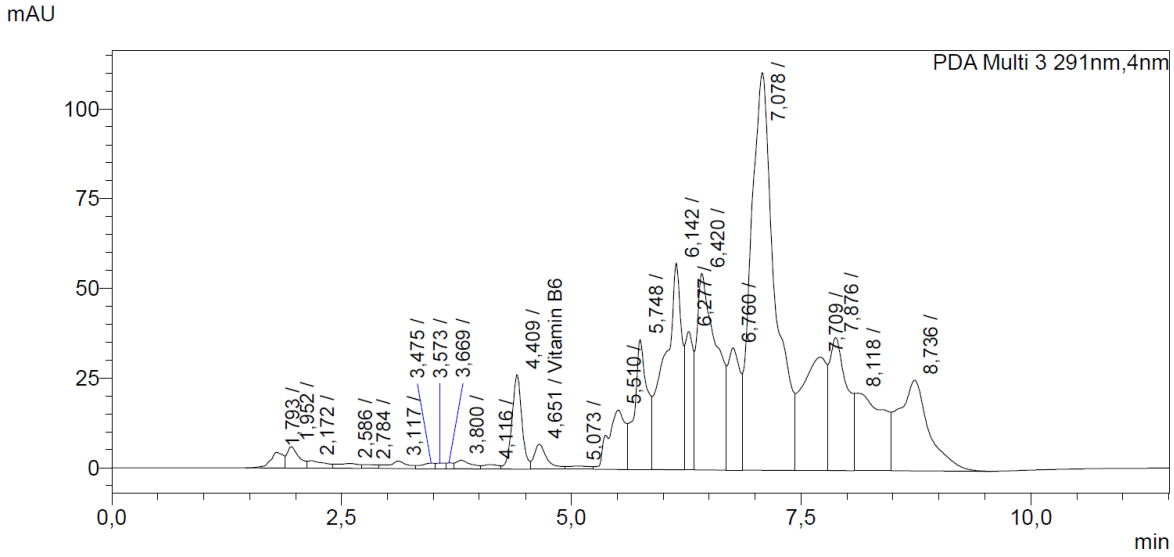

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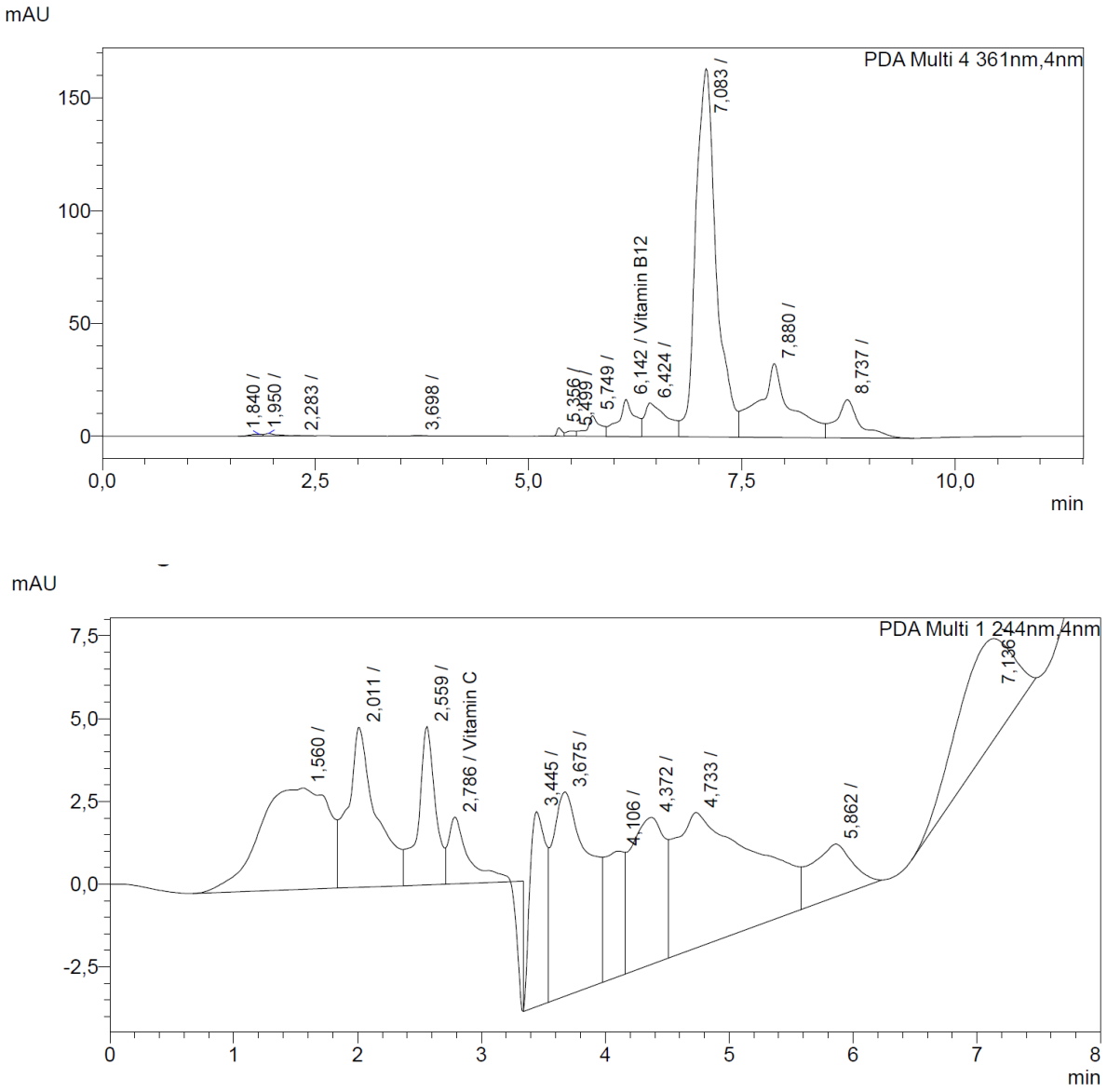

Figure 6. Chromatogram of sample extract in 0.1 N HCl.

Table 2. Amount and retention times of vitamins in extracts

Vitamin	*0.1 N HCl*		
	Holding time, sec	Concentration, mg/l	Amount in 100 g sample, mg
Vitamin B_1	1,954	14,287	71,435
Vitamin B_9	5.76	0.11	0.55
Vitamin B_2	7,085	31,599	158
Vitamin B_6	4,651	8,208	41.04
Vitamin B_{12}	6,142	0.611	3,055
Vitamin C	2,786	25,751	128.76

Conclusion

1. The methods of preparation of extracts of the root and vegetative organs of Gulkhairi in 0.1 N hydrochloric acid have been improved.
2. The water-soluble vitamins contained in the root and vegetative organs of Gulkhairi were dissolved and the amount of vitamins in the extracts was determined by the "High-performance liquid chromatography" method.
3. Chromatograms of the extracts of 0.1 N HCl of the tested cauliflower root and vegetative organs samples were taken, and the results were processed by the method of mathematical statistics and the amount of vitamins in 100 grams of the sample was determined.
4. Taking into account that the root and vegetative organs of Gulkhairi are rich in vitamins, it was scientifically explained that they can be used in the treatment of respiratory diseases.

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