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CHEMICAL COMPOSITION OF PEAR AND ITS IMPORTANCE IN FOLK MEDICINE

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Abstract
The article provides information about the healing properties of pear, including their importance in digestion, as well as the content of water-soluble vitamins. Information about the main properties of pear fruit and its positive effect on the human body in certain medical conditions and diseases was systematically researched based on the literature and relevant scientific data. The use of pear in medicine, the effectiveness of its use in various diseases, as well as the scientific basis of a diet using have been studied.

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Introduction. The human digestive system is perfectly designed, and during the digestion process, food is mechanically crushed, chemically decomposed and absorbed. Nowadays, all digestive diseases are mainly caused by poor diet. As a result, many diseases related to the digestive system arise. Digestive disorders remain a pressing medical problem and attract the attention of healthcare professionals [1]. According to the Russian Ministry of Health and Social Development, diseases of the digestive system occupy 3rd place in the overall morbidity rate of the country's population. More than 37% of patients who visit doctors daily complain of diseases of the digestive system. Most of them are people of working age. At the moment, the result of a study of the level of people's awareness of drugs such as Festal and Mezim, which are used by many people for diseases of the digestive system, is only 14%. The main component of such drugs is the enzyme pancreatin.

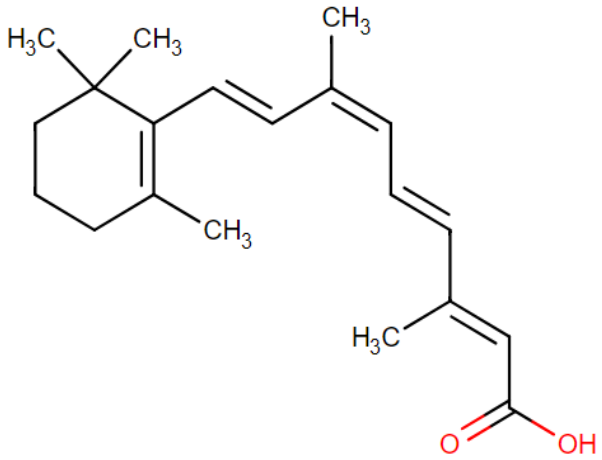


Figure 1. Chemical structure of the pancreatin enzyme.

Pancreatin is mainly obtained from the pancreas of pigs [2]. Constant use of drugs such as Festal and Mezim, the main composition of which is pancreatin, slows down the natural secretion of digestive juices and at the same time causes abdominal pain. At the same time, the consumption of pork products is in accordance with the religion of Islam prohibited for Muslims. But, like all natural and medicinal fruits, eating a pear after a regular meal allows you to get rid of digestive problems. Due to the high amount of organic fiber, sorbitol and fructose contained in pears compared to all other fruits, we can include them in the natural collection of nutrients that regulate digestion [3]. Let's talk about the healing properties of pear fruits, as well as their role in digestion and the vitamins.

Pear (Latin: *Pyrus*) - Rose's Families (*Rosaceae*) is a type of fruit and ornamental trees and shrubs belonging to the family. Pears were grown in ancient Persia, Greece and the Roman Empire. Currently, there are about a thousand varieties of pears. Today, 17 varieties of pears are grown in Uzbekistan. The sown area of pear fruits has increased 2.2 times over 28 years, that is, from 19,000 hectares in 1991 to 42,000 hectares in 2019 [4]. The Nashvati pear variety is a group of pear varieties grown using folk selection. This group includes varieties such as winter nashwati, autumn white nashwati, chillaki nashwati and summer nashwati. In Uzbekistan, a wild species of pear called murut, olmurut - Korzhinsky pear (P. korshinskyi Litv.) grows in the foothills and slopes of mountains, in streams. The fruits are round or pear-shaped. It has been grown in Uzbekistan since ancient times. Seedlings of cultivated varieties are grown by grafting onto cuttings grown from wild pear seeds. The harvest is harvested after 4-6 years. The height of the tree is 8–12 m. It blooms earlier than other varieties of pears. Depending on the variety, the fruits ripen from late June to early October, weigh 120-250 g (sometimes 500-700 g), most are yellowish-blue, some colored, with an oily foam. smooth on top. The pulp is pale yellow or bluish-white, juicy, sweet and sour, the seeds are large; evenings remain until March-April. Pears contain many vitamins and minerals, including vitamin C, as well as dietary fiber, phytochemicals and antioxidants [5]. Pear can grow in harsh climates. It can withstand temperatures up to -25°C and temperatures up to 40°C [6]. The cooling period is different for each pear variety. Pears do not require perfect soil to grow, pears grow well in neutral to slightly acidic soil with a pH of no more than 7.5 [7]. Pear fruits contain many beneficial substances that promote health. Pear fruits contain proteins, carbohydrates (glucose, fructose, sucrose, pectin, starch, fiber, hemicellulose), arbutin, tannins and essential oils. It contains 0.4% protein, up to 9% sugar, 2.9% polysaccharides, 0.5% organic acids, up to 0.16% additives and dyes, up to 0.25% arbutin, up to 0.03-0.07 % chlorogenic acid. In addition, from microelements there are a number of important vitamins (A, B_1, B_2, B_6, B_9, E, C, P), carotene, sodium, potassium, calcium, magnesium, silicon, phosphorus, sulfur, chlorine, cobalt, vanadium, contains iron, iodine, nickel, rubidium, zinc and other various elements, aromatic substances, enzymes, phytoncides. Pears are rich in vitamin C, an important component that acts as an antioxidant in the body. Vitamin C is essential for the immune system and skin health [8, 9]. It also helps produce collagen, which is essential for healthy connective tissues

such as skin, tendons and ligaments [10]. Pears are rich in fiber, which is good for the digestive system [11]. These fibers help regulate bowel movements and prevent constipation. It also helps lower cholesterol and increase feelings of fullness, which helps maintain a healthy weight [12]. Copper is also necessary for the formation of red blood cells and the proper functioning of the immune system [13]. Pears are rich in potassium, which is essential for heart health. Potassium helps regulate blood pressure by counteracting the effects of salt in the diet. Pears are rich in vitamin K, which is essential for blood clotting and bone health. Vitamin K deficiency can cause severe bleeding and increase the risk of bone fractures [10].The heart muscle needs potassium to function well, and pears have a lot of it. It is useful for cell regeneration. This fruit has the ability to improve the functioning of the cardiovascular system, prevent inflammation of the kidneys and bladder, and cleanse the body of various poisons and toxins (cholesterol) [14].Pear is distinguished by its richness. Although pears are sweeter than apples, they are relatively low in sugar [15]. Since pears contain slightly more fructose than glucose, sweet pears are recommended for patients suffering from obesity or diabetes, which leads to a decrease in insulin requirements. Pear strengthens the immune system and increases the body's defense response, fights infections, overcomes colds, and it is also useful for depression. These beneficial properties are due to the presence of essential oil. Pears retain their beneficial properties even during heat treatment, so they are used in cooking, drying and preparing various baked goods. Men are cured of prostatitis when they eat pears. Pears are good for diabetics. It should also be eaten if you have tuberculosis. Young pear leaves contain antifungal substances, so it is used for dermatitis and fungal diseases. These fruits are useful in treating anemia. Pear fruits are recommended for pregnant women and breastfeeding children; they play a role in the formation of blood cells. To get rid of bronchitis, it is recommended to mix a teaspoon of rosehip syrup with a glass of pear juice and drink half a glass three times a day. Boiled and fried pears are recommended for patients which are tuberculosis and bronchitis. Traditional medicine scientists recommend that pear fruits for the following diseases: decreased immunity, increased heart rate, fatigue (eating several pears reduces muscle pain), dizziness, and depression. It is also useful for the prevention of infectious diseases, for impaired capillary permeability, for a tendency to colds, for a severe cough, for metabolic disorders, including symptoms of obesity, in case of intestinal dysfunction, loss of appetite, in the treatment of prostatitis, in wound healing (the pear regenerates the skin faster, restores it). Young leaves relieve colds, treat fungi, and are useful in the treatment of dermatitis [8, 9].

Based on the above information, it was planned to study the amount of water-soluble vitamins in Nashvati pear fruits grown in Uzbekistan using the HPLC method.

Experimental part.

Reagents and equipments. Vitamin B_{12} was obtained from Rhydburg Pharmaceuticals (Germany), vitamin C from Carl Roth GmbH (Germany), B_9 from DSM Nutritional Products GmbH (Germany), vitamins B_1, B_2, B_3, B_6, PP from "BLDPharm "(China). We used HPLC grade water, acetonitrile, and reagent grade acetic acid. and sodium hydroxide.

Quantitative determination of water-soluble vitamins in the plant was carried out using a high-performance liquid chromatograph LC-40 Nexera Lite manufactured by Shimadzu, Japan.

Preparation of standard solutions. C (CAS 50-81-7), B1 (CAS 59-43-8), B6 (CAS 58-56-0), B3 (CAS 59-67-6), B12 (CAS 68–19–9).) and Vitamin PP solutions (CAS 98-92-0) (100 mg/l) are prepared by dissolving 5 mg of each vitamin in 50 ml of 0.1 N HCl solution. 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 200 µl of the original vitamins B_1, B_6, B_3, B_{12}, PP were mixed and a solution was prepared with a concentration of each vitamin of 14.286 mg/l. In this way, standard solutions of 7.143, 3.571, 1.786 mg/l were prepared. Standard solutions

of vitamin C were also prepared with concentrations of 286, 143, 71.5, 57.2 mg/l. Pure water with a concentration of 0 mg/l was used to construct the calibration graph.

Preparation of sample extract. Extracting water-soluble vitamins, 1 g of the test sample was weighed out, placed in a 50 ml conical flask, and 25 ml of 0.1 N HCl solution was added. The mixture was extracted in an ultrasonic bath GT SONIC-D3 (China) at a temperature of 60°C for 20 minutes. Then the mixture was cooled, filtered and the volume of water was brought to 25 ml in a volumetric flask. 1.5 ml of extract was filtered through a syringe filter with a pore size of 0.22 μm, placed in a vial and used for analysis.

Chromatographic conditions. Identification of vitamins. Standard Solutions and Sample Extracts LC-40 Nexera Lite High Performance Liquid Chromatograph, consisting of an LC-40D pump, SIL-40 autosampler, SPD-M40 photodiode array detector (PDA) and LabSolutions ver. Software 6.92 has been analyzed. A GIST C18 reverse-phase column (150 × 4.6 mm; 5 μm, Shimadzu, Japan) with a gradient mobile phase consisting of acetonitrile (A) and 0.25% acetic acid in water (B) (Table 1), used. The injection volume was 10 μL, the flow rate was 0.6 mL/min, and the column thermostat temperature was set to 40°C. The analytical signal (peak area) of each vitamin was recorded at three wavelengths: 265, 291, 550 nm. To determine vitamin C, a 15-minute gradient was used (Table 2), the analytical signal was measured at a wavelength of 265 nm.

Table 1. Mobile phase gradient program for determining vitamins

Time, minute	Acetonitrile (A),%	0.5% acetic acid (B), %
0	0	100
3	0	100
14	20	80
17	50	50
18	0	100
25	Termination	

Table 2. Mobile phase gradient program for determination of vitamin C

Time, minute	Acetonitrile (A),%	0.5% acetic acid (B), %
0	0	100
2	0	100
6	50	50
6.01	0	100
15	Termination	

Results and their discussion. Determination of vitamins in Nashwati pear fruit extract. A chromatogram of the sample extract was obtained (Fig. 2, 3), and based on the results, the amount of vitamins in 100 g of fruit was calculated using the following formula, presented in Table 3.

$$X = \frac{C_{vit} \cdot V_{extract}}{m_{sample}} \cdot 100\ g$$

Here X is the amount of vitamins in 100 g of fruit, mg;

C_{vit}- concentration of vitamin in the extract, determined by the HPLC method, mg/l;

$V_{extract}$– volume of sample extract, l;

m_{sample}– weight of the sample that is taken to prepare the extract

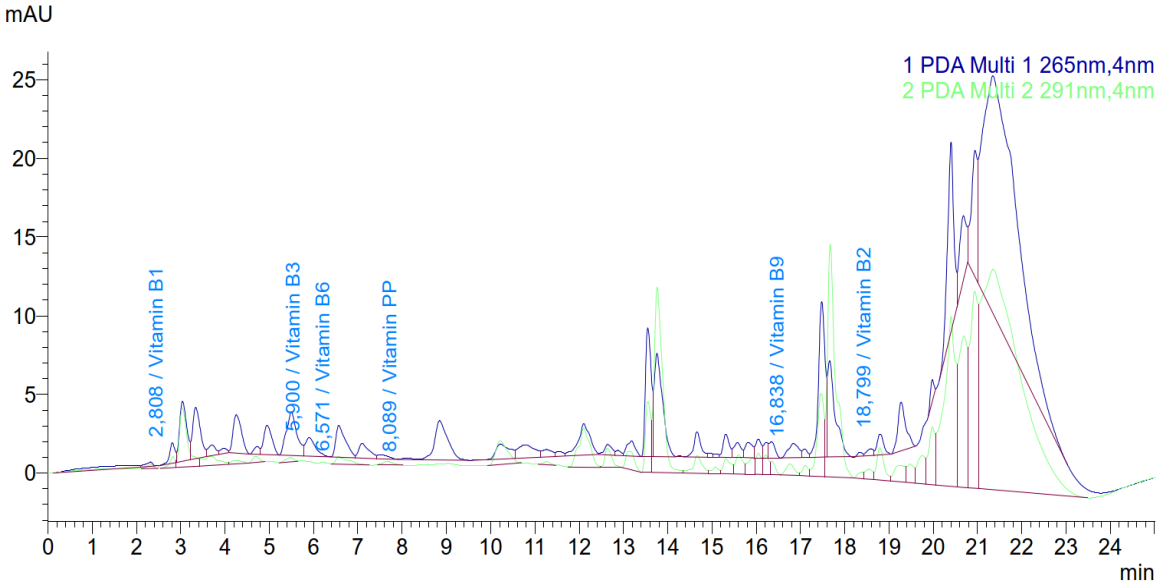


Figure 2. Chromatogram for determining vitamins in the sample extract

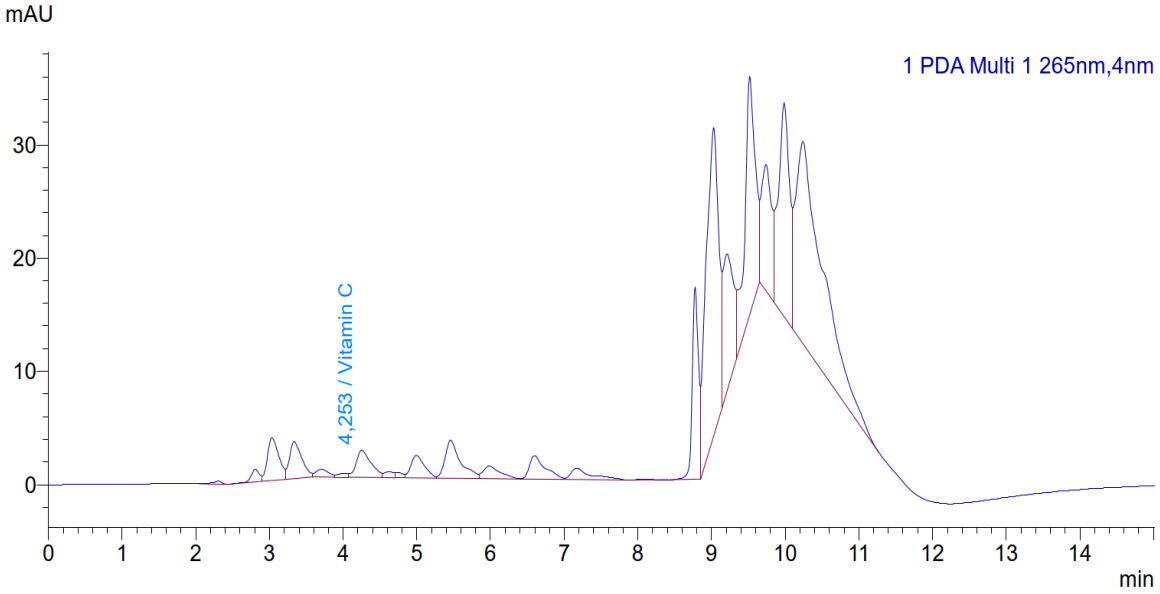


Figure 3. Chromatogram for determining the amount of vitamin C in a sample extract

Table 3. Amount and retention time of vitamins in the extract

Vitamins	Holding time, sec	Concentration, mg/l	Amount per 100 g sample, mg
Vitamin B_1	2.808	0.407	1.018
Vitamin B_3	5.9	0.46	1.150
Vitamin PP	8,089	0.058	0.145
Vitamin B_9	16,838	0.454	1.135
Vitamin B_2	18,799	0.462	1.155
Vitamin B_6	6,571	0.241	0.603

Vitamin B_{12}	Not identified	0	0.000
Vitamin C	4.253	1.503	3.758

This study examined the amount of vitamins contained in 100 grams of a sample of Nashvat pear. Eating one medium pear satisfies the daily requirement for vitamin B_2. Vitamin B_{12} (cobalamin) was not detected in the sample. Vitamin C (ascorbic acid) has 1,503 mg/l concentration and was found to be the highest of all vitamins at 3,758 mg per 100 grams.

Conclusion. Nowadays, regularly eating natural and medicinal fruits like pears after meals helps prevent various diseases, including digestive problems, and get the vitamins which we need on a daily basis. Chronic use of drugs such as Festal and Mezim, whose main ingredient is pancreatin, an enzyme derived from the pancreas of pigs, has been reported to slow down the natural digestion process and cause abdominal pain. Such medicines can prevent certain diseases, but we must not forget that medicines benefit some organs of our body but harm other organs. If we want healthy healing, we need to use more of the natural products that nature has given us. Pears are rich in fiber, vitamins, minerals and antioxidants to use them a nutritious addition to any diet.

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