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QUALIFICATION WORK

on the topic:

JUSTIFICATION OF THE COMPOSITION AND TECHNOLOGY OF THE EXTEMPORANEOUS VITAMIN HERBAL MIXTURE FOR HYPOVITAMINOSIS

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ANNOTATION

The qualification work is devoted to the justification of the composition and technology of the extemporaneous vitamin herbal mixture for hypovitaminosis use as a tonic and vitamin preparation. The work is presented on 43 pages of printed text, consists of an introduction, 3 chapters, general conclusions, a list of used sources, and appendices. The list of used sources contains 32 items. The work is illustrated with 7 tables and 2 figures.

Key words: collection, tonic, extemporaneous medicine, multivitamin, technology.

АНОТАЦІЯ

Кваліфікаційна робота присвячена обґрунтуванню складу та технології екстемпоральної вітамінної трав'яної суміші при гіповітамінозі, як загальнозміцнюючого та вітамінного препарату.

Робота викладена на 43 сторінках друкованого тексту, складається зі вступу, 3-х розділів, загальних висновків, списку використаних джерел, додатків. Перелік використаних джерел містить 32 позицій. Роботу ілюстровано 7 таблицями та 2 рисунками.

Ключові слова: збір, загальнозміцнюючий засіб, екстемпоральні ліки, полівітаміни, технологія.

CONTENT

INTRODUCTION

Relevance of the topic

Meeting our vitamin needs is crucial for both our physical and mental health. A diet rich in essential vitamins can boost our immune system. Besides following basic preventive measures to reduce the risk of infection and spreading diseases like SARS-CoV-2, it's essential to focus on complete nutrition.

A healthy and balanced diet can provide many vitamins. But the most important ones are A, B6, B12, C, D, E and K. A deficiency of these vitamins can lead to various diseases and exhaustion [4, 13, 14].

With age, the amount of insulin in the blood increases, under its influence, the glucose that comes with food turns into fat. And there are no signals for the consumption of accumulated fat reserves. A closed circle is created: first, moderate fat reserves accumulate in the body, and then obesity begins: an obese person develops an increased appetite. And excessive accumulation of fat provokes the appearance of the main diseases of aging: atherosclerosis, diabetes, gout, liver and kidney diseases, and as a result - a reduction in life expectancy by 6-10 years.

These problems can be avoided if you follow the recommendations of specialists who advise you to eat food 4-5 times a day, in small portions, giving preference to products that are easily digested, with a high content of vitamins and minerals, to introduce into the diet products with substances endowed with the ability to slow down the aging of the body. This list includes:

- vitamins of group B (meat, eggs, legumes and cereals, nuts, lettuce, parsley, spinach);
- vitamins of group A (butter, milk, carrots, sweet pepper, tomatoes, liver);
- vitamins of group E (sunflower oil, green beans, germs of grain crops, liver, kidneys);

- minerals: copper (cereals, cereals, mushrooms, strawberries, watermelons, beef), manganese (parsley, dill, beets, pumpkin, raspberries, various cereals, cereals), zinc (liver, kidneys, lungs, chicken meat, hard cheeses) etc.

Substances, namely vitamins and minerals, which are endowed with the ability to slow down the aging of the body, are also found in medicinal raw materials. The growing role of the use of medicinal plants and phytotherapeutic drugs for the treatment of elderly patients is obvious. Interest in them is largely due to the fact that the healing properties of medicinal plants and preparations made from them are practically harmless, effective, relatively affordable, and sometimes have no competitors among synthetic drugs. Medicinal preparations of plant origin occupy a significant place in modern pharmacotherapy. These are chemically pure substances isolated from plants, on the basis of which numerous analogues and purified complexes of natural substances are synthesized, and a large group of complex preparations from plants (infusions, decoctions, collections, tinctures, extracts, etc.). Plants have been used for medicinal purposes for centuries. Despite the significant progress of modern organic chemistry, which ensures the production of high-quality synthetic biologically active substances used in pharmacy, the popularity of herbal preparations throughout the world not only does not decrease, but also steadily increases[4, 13, 15].

One of the simplest forms of using medicinal plants is herbal preparations, ie, the preparation of aqueous extracts, among the advantages of which are ease of manufacture, complex action, and high bioavailability of active pharmaceutical ingredients [13, 20].

We propose a vitamin herbal mixture for hypovitaminosis use as a tonic and vitamin preparation.

The purpose of the research is justification of the composition and technology of the extemporaneous vitamin herbal mixture for hypovitaminosis use as a tonic and vitamin preparation.

To achieve the set goal, it was necessary to solve the following **tasks research**:

• analyze and summarize literature data on hypovitaminosis;

• analyze the range of tonic and multivitamin medicines;

• conduct an analysis of the extemporaneous formulation of the fees;

• theoretically and experimentally choose the composition and technology of tonic and vitamin collection;

• to carry out microelement analysis of the plants included in the collection.

Research objects: drugs used to improve health.

Subject of research: tonic and multivitamin collection containing : rose hips, blackcurrant leaves, peppermint leaves and blueberries .

Research methods. To achieve the goal, general scientific research methods were used: analysis, synthesis, comparison, analogy, generalization, comparison, systematization for processing literary data; observation, comparison, measurement, modeling, experiment for preparing and researching ointment samples; as well as physico-chemical and technological methods.

Practical significance of the obtained results. On the basis of organoleptic, physico-chemical, pharmacotechnological studies, the composition and technology of the tonic, vitamin collection for hypovitaminosis use is substantiated. The obtained results can be used in the further development of the technology of this medicinal product. The work carried out can be used for further improvement of the composition of the collection in order to expand the range of vitamin preparations.

Elements of scientific research. In the work, the impact of the technological parameters of the collection raw materials on the yield of extractive substances was studied, the microelement composition of the raw materials included in the composition of the collection was investigated. On the basis of the conducted research, the technology of tonic and multivitamin collection was developed for hypovitaminosis use.

Approbation of research results and publication. The results of the work are presented on III Scientific and practical internet conference with international participation, dedicated to the 40th anniversary of the foundation of the Department of Organization, Economy and Pharmacy Management training of pharmacy

specialists within the “life long learning” concept: Science, Education, Practice October 23-24, 2024 year, scientific publications were published on the topic of the work.

Scope and structure of work. The work is presented on 43 pages of printed text, consists of an introduction, 3 chapters, general conclusions, a list of used sources, and appendices. The list of used sources contains 32 items. The work is illustrated with 7 tables and 2 figures.

CHAPTER 1
PROSPECTS FOR THE USE OF TONIC AND VITAMIN PREPARATIONS OF PLANT ORIGIN

1.1. Vitamins and their influence on metabolism

Vitamins are a group of biologically highly active, low-molecular-weight organic compounds of various chemical natures that are practically not synthesised in the human body or are synthesised in insufficient quantities to fully meet the needs, are mainly ingested with food and are vital for ensuring the course and regulation of metabolic processes in the body. Vitamins are micronutrients that are among the essential nutritional factors, and their content in food is low, usually ranging from 10 mg to 100 mg per 100 g. Vitamins have an exceptional property - the ability to have high biological activity in small doses, while not being a source of energy or plastic material, biological catalysts of vital body functions. According to their physical and chemical properties and solubility, vitamins A, E, D are fat-soluble, characterised by thermostability, resistant to acids and alkalis, and their main characteristic is the ability to promote the absorption of macro- and microelements. Vitamins A, E, D are necessary at all stages of growth and development of the child's body, as well as in the processes of adaptation. The main types of vitamin metabolism disorders are avitaminosis, hypo-, hyper- and dysvitaminosis, and polyhypovitaminosis. It is important to constantly monitor the sufficient content of each vitamin in the daily diet of children. The following methods are known for assessing vitamin supply: clinical, biochemical, and calculation of vitamin content [6, 13, 14].

It is known that inflammatory processes are activated in the body of elderly people over the years, however, these processes may not have obvious manifestations. This is a property of aging. In the conditions of a coronavirus infection, the level of inflammation increases sharply, and in severe forms it goes out of the body's control, the so -called "cytokine storm", which leads to a complicated course of the disease.

Ensuring the normal functioning of the body and maintaining the appropriate level of metabolic processes requires a constant supply of not only macronutrients — proteins, fats, and carbohydrates, which are an important source of nutrients and energy — but also a number of biologically active compounds — micronutrients. Among these compounds, an important role belongs to vitamins, which are exogenous alimentary factors and must be constantly supplied with food products. Vitamins are necessary to ensure various vital functions related to the processes of synthesis and decomposition of various compounds, extraction and use of energy, transportation of substances. Vitamins and their complexes affect cellular metabolism, prevent the action of harmful factors, stimulate the activity of antioxidant defense systems and ensure the normalization of redox processes, at the same time they are a source of energy for the body, increase the body's resistance to the action of adverse exogenous factors. Vitamins are a group of biologically highly active, low molecular weight organic compounds of various chemical nature, which are practically not synthesized in the human body or are synthesized in quantities insufficient for full supply, mainly come with food and are vital for ensuring the course and regulation of metabolic processes in the body [4, 13, 17, 29].

Vitamins are micronutrients that belong to the number of irreplaceable (essential) factors of nutrition, their content in food products is small, as a rule, in the range from 10 mg to 100 mg per 100 g. Vitamins have an exceptional property - the ability for high biological activity in small doses, at the same time it is not a reflection of energy or plastic material. Vitamins, acting as biological catalysts, affect most vital functions of the body. The high biological activity of vitamins lies in their participation in the construction of enzyme systems as coenzymes, which, forming a complex with the protein part, directly carry out chemical reactions catalyzed by this enzyme. It should be noted that the protein component of enzymes is responsible for the high specificity of their action. Another important function of vitamins is their participation in the formation and functioning of cell membranes and cell organelles. Vitamins A, E, D are necessary at all stages of growth and development of the child's body, adaptation processes. The need for vitamins

increases significantly in children during the period of intensive growth, under the influence of certain climatic and weather conditions that lead to prolonged hypothermia, during sharp changes in the temperature of the atmospheric air, during intense physical exertion, neuropsychological stress, in the case of following a diet with restrictions, with chronic somatic diseases, after the transfer of acute infections or surgical intervention, under the condition of using medicines, living in ecologically unfavorable areas. Concern is also caused by the fact that the number of children with varying degrees of vitamin and mineral deficiency is continuously increasing. That is why it is necessary to constantly monitor the adequacy of the content of each of the vitamins in the daily diet of children [7, 13, 29].

In many cases, the imbalance of the nutritional structure occurs due to a higher proportion of low-quality fats and carbohydrates. It is important, taking into account age characteristics, to establish, maintain, and support a full and varied diet of the elderly. It is necessary to ensure the body's needs in basic nutrients - proteins, fats, carbohydrates, including dietary fibers, as well as vitamins, minerals, in particular electrolytes. After all, the work of the body as a whole, as well as its individual subsystems and the immune system, in particular, depends on this.

Protection against viral infections (especially coronavirus infection) places increased demands on the functioning of the respiratory system. Accordingly, to maintain the respiratory system, it is important not to forget about daily physical exercises in a well-ventilated room and, in particular, breathing exercises.

Need should be provided, first of all, to maintain resistance to infections. Protein deficiency can be manifested both with malnutrition in general and with a deformed structure of nutrition, when a lack of high-quality protein is combined with an excessive consumption of carbohydrates and fats [4, 13, 20].

1.2. Features of nutrition.

The main sources squirrel in the case of ordinary nutrition, there are, first of all, products of animal origin - meat, fish, cheeses, eggs. Their value lies not only in the high content of protein, but also in other components - in the high content of certain

vitamins, for example, vitamin A, group B vitamins, etc. The disadvantage of products of animal origin is that they can "acidify" the body. It is desirable that all the specified groups of products are represented in the diet. Lean types of meat, or liver, or fish, or cheeses (hard or sour milk), or eggs should preferably be on the table 4-5 days a week. As for fish, you can use both river and sea fish, thermally processed. When choosing marine fish, you should give preference to its fatty varieties (mackerel, herring, capelin). Since these varieties are rich in Omega-3 fatty acids, which are involved in immune protection, they have an anti-inflammatory effect, which is important for the stable operation of the respiratory system [7, 13, 20].

We remember the importance of the systematic use of vegetable protein - legumes, and to a certain extent cereals and nuts. They are not just a substitute for animal protein, but an independent product with its own characteristics, advantages and requirements.

Some products can be used as pre- and probiotics . The influence of the above-mentioned products is carried out through the intestinal immune system, which in turn affects the immune defense of the body as a whole. According to the literature, the intestine can be a target for coronavirus infection . Products with pre- and probiotic properties stimulate the activity and development of beneficial microflora in the intestines and, accordingly, improve the immune protection of mucous membranes [7, 11, 13].

Fermented vegetables, for example, sauerkraut, and the above-mentioned legumes, etc., have prebiotic properties. This is due to the positive effect of the fermented product and organic acids, which are formed in the fermentation process, on the work of the intestine and its microflora. Legumes should be included in the diet at least 2 times a week.

Live cultures of fermented milk products (kefir, herolact, ayran, sourdough, natural yogurt, etc.) have probiotic properties.

That is, in addition to products rich in protein, the diet should include fermented milk products (subject to tolerance), legumes, fermented vegetables and, accordingly, other sources of dietary fiber [11, 13, 20].

A number of vitamins have an anti-inflammatory effect on the body - among them vitamin A and carotenoids, vitamins E, C, vitamins of group B. Vitamin A is found in butter, liver, and egg yolk. The source of vitamin E is vegetable oils. It is recommended to use oil in a small (20-30 g/d) amount, preferably of different types - flax, olive, sunflower. Adequate daily consumption of quality fats also supports the functioning of the respiratory system.

Modern dietetics reconsiders the role of lard as a food product, in contrast to the dietary advice of the end of the last century, which practically excluded the consumption of lard. Consumption of 30 g of fresh lard per day is considered useful today. However, when using lard, it should be combined with vegetables. It should be remembered that in addition to butter, lard and oils, a certain amount of fat can come with the consumption of meat, fish and cheeses [7, 11, 20].

Vegetables and fruits have various positive effects, including they are a source of vitamins, minerals, and fiber. Orange, yellow and red vegetables and fruits are, in particular, sources of vitamin C and carotenoids with anti-inflammatory effects.

Cereals should be consumed daily, as, in addition to high energy value, most of them are a source of B vitamins and fiber. It is better to use coarsely ground cereals, alternate dishes from millet, corn, barley, wheat and buckwheat.

The body will benefit from eating walnuts (2-3 kernels per day), a small handful of seeds (pumpkin, sunflower), a few teaspoons of sesame or flax. They will supplement the diet with healthy fats, vitamins, and minerals.

It is known that in the period from early spring to early summer, an important source of useful substances is fresh greens : a source of bioflavonoids with anti-inflammatory effects. These are onion feathers, dill, various leafy greens (young cabbage, sour cream, sorrel, quinoa, etc.). N. Walker included dandelion in the list of products that he analyzed according to the degree of "acidifying" and "alkalizing"

effect on the human body. This list can be supplemented by several leaves (4-5) from a blackcurrant bush, currant, gooseberry, young nettle leaves, plantain [7, 20].

Sufficient supply of vitamin D also plays an important role in resistance to infectious diseases. The main food source of the vitamin is fatty marine fish. At the same time, the synthesis of vitamin D in the skin under the influence of sunlight is reduced in the elderly, and the consumption of marine fish is insufficient in many. Therefore, it would be advisable to take prophylactic doses of vitamin D at least during the period of quarantine and self-isolation or continue to take therapeutic doses prescribed by the doctor.

According to the recommendations, you should limit the consumption of salt (4-6 g per day), dishes based on meat and fish broths (no more than 1-2 times a week), give preference to products and dishes that normalize the intestinal microflora (kefir, yogurts, lactogerovit, herolact) and prevent the development of an acidic (acidotic) internal environment (vegetables and fruits, including potatoes, beets, carrots, tomatoes, apples, pears, grapes, etc.) [21, 22, 29, 31].

A large amount of mineral substances, in particular calcium salts, accumulates in the human body. They are deposited on the walls of blood vessels, joints, disrupting their mobility. Along with this, the concentration of mineral substances decreases in some tissues. Also, in old age, in particular, in women, iron deficiency is observed . Another threat is dehydration, caused by a lack of fluid or potassium intake.

There are almost 70 chemical elements in the human body.

Scientists have established that the human body needs a constant replenishment of more than 20 of them for normal life. These are iron, zinc, copper, iodine, selenium, manganese, molybdenum, fluorine, chromium, cobalt, silicon, vanadium, boron, nickel, arsenic, tin, etc. Supplying the body with a sufficient amount of these elements is possible only under the condition of a varied diet.

Mineral substances are important components of the skeleton, biological fluids and enzymes. They also contribute to the transmission of nerve impulses.

Living organisms cannot independently synthesize mineral substances. They get them from food, water and air [7, 11].

Plants accumulate minerals from the soil. Their number depends on the place of plant germination and the presence of fertilizers in the soil.

Drinking water also contains minerals, their content depends on the place from which the water is obtained.

A person needs small amounts of minerals. However, the human body cannot create their reserves, so it needs constant replenishment. The need for minerals depends on age, gender and other factors. For example, the increased need for iron in women is associated with menstruation and pregnancy. Athletes need more sodium, as it is intensively excreted from the body during sweating.

An excessive amount of mineral substances affects the regulatory functions of the body and can lead to malfunctions in its functioning. Excessive amounts of minerals can enter the body as a result of excessive use of biologically active supplements and products enriched with mineral substances [7, 13, 20].

The assimilation of mineral substances by the body can be hindered by:

- abuse of coffee
- drinking alcohol
- smoking
- some medicines
- some birth control pills
- substances contained in such products as rhubarb and spinach

During heat treatment, minerals are lost much less than vitamins. However, during refining or purification, some of the mineral substances disappear. Therefore, it is important to consume more whole grain and unrefined products.

The value of mineral substances for the human body and their presence in food products are shown in table 1.1 .

In many countries, there is a natural deficiency of iodine. Its deficiency in the human body leads to many disorders of the thyroid gland, metabolic disorders, hearing loss, delayed physical and mental development, etc. In less severe cases,

iodine deficiency causes apathy, a decrease in mental activity, memory, and the ability to concentrate [7, 11, 13, 20].

Table 1.1.

The importance of minerals for the human body

Mineral	Why is it important?	Contained in food products
Na (sodium)	• to regulate the concentration of dissolved substances and water in the body • to maintain the acid-alkaline balance • for processes of absorption and movement of fluids from the blood into the cell and back	table salt, hard cheese, rye bread, canned goods, meat products, olives
K (potassium)	• for the transmission of nerve impulses • to maintain the acid-alkaline balance of the blood • for normal carbohydrate metabolism • to ensure muscle contraction	vegetable products: dried fruits and berries, nuts, seeds, Jerusalem artichoke, potatoes, radishes, cabbage, green vegetables, beets, bananas, rye bread, currants, tomatoes
Ca (calcium)	• is part of the human skeleton, teeth and other tissues • to ensure metabolism, maintain normal permeability of the walls of blood vessels • for normal muscle work • for blood coagulation processes • to regulate blood pressure and cholesterol levels • for normal kidney function • for the transmission of nerve impulses	milk and fermented milk products (especially cheese), nuts, especially almonds, seeds, fish (with bones), spinach
Mg (magnesium)	• for metabolism • in the composition of salts in the body - for the formation of bone tissue, to strengthen the role of calcium in the body (for example, during the development and renewal of bone tissue) • for the work of the heart muscle and regulation of blood circulation • for the work of the nervous system	nuts, seeds, rye bread, spinach, legumes, buckwheat, whole grains, pork, beef and chicken, banana, broccoli
P (phosphorus)	• to fight caries - protects tooth enamel • to slow down the conversion of sugar in the oral cavity into organic acids, as a result of which the processes of tooth demineralization are slowed down	seeds, nuts, dairy products (especially cheese), liver, poultry, beef, rye bread, fish, whole grains, legumes
S (sulfur)	• for the work of proteins and enzymes in almost the entire body • for the formation of antibodies • for bones and cartilage	grains, nuts, meat, fish, soybeans

Cl (chlorine)	• to regulate the concentration of dissolved substances and water in the body • to maintain the acid-alkaline balance • for processes of absorption and movement of fluids from the blood into the cell and back • for the formation of hydrochloric acid in the stomach	table salt
Fe (iron)	• for hematopoiesis • for energy generation • to increase the body's resistance to stress and diseases • to reduce fatigue and maintain normal skin color	liver, blood sausage, seeds, eggs, raisins, rye bread, lean beef and pork, whole grains, buckwheat, strawberries
Zn (zinc)	• contains more than 300 enzymes • to participate in the hematopoietic process • for the normal growth of the organism, obtaining offspring and DNA synthesis • for immune system support and wound healing • for the antioxidant protection of the body, the development of the genitals, the functioning of the prostate gland and the activity of female sex hormones • for the normal development of taste buds • for the manifestation of insulin action • for vitamin A metabolism and vision	legumes, crabs, bran, whole grain products, eggs
Cu (copper)	• for the formation of hemoglobin and facilitating the assimilation of iron during the formation of erythrocytes • for the work of enzymes involved in the production of collagen and elastin • for antioxidant protection • for energy production in cells • for the formation of bone tissue	liver, cocoa powder, meat, legumes, whole grains, seeds, nuts, buckwheat, rye bread, avocado, beets, seafood
I (iodine)	• participates in metabolism and thermoregulation of the body • important for protein synthesis	iodized salt, seafood, cheese, eggs, some types of rye bread and yogurt
Se (selenium)	• to strengthen the immune system • for the formation of thyroid hormones • participates in the protection of cell functions against adverse factors, in particular against premature aging	peanuts, liver, seafood, sunflower seeds, meat

To prevent problems related to iodine deficiency, you need to eat more seafood. But the best choice is to use iodized salt. At the same time, it is necessary to follow only a few rules:

- iodized salt has a shelf life of no more than 6 months. Therefore, you need to buy salt in small packages;
- iodized salt should be stored tightly closed, in a dry and dark place. Violation of storage conditions will lead to evaporation of iodine compounds;
- at high temperatures, iodine is quickly weathered. Therefore, iodized salt should be added to dishes before serving.

The rate of consumption of table salt [7, 13, 20].

Sodium performs important functions in the body. It maintains the water-salt balance in the blood and other body fluids, participates in the conduction of nerve impulses, and plays a significant role in the activity of the heart.

However, most people consume too much sodium in the form of table salt: an average of 9–12 g per day, with a maximum of 5 g recommended. Excessive sodium intake causes high blood pressure. And this, in turn, increases the risk of cardiovascular diseases.

According to the WHO, if salt consumption was reduced to the recommended level of less than 5 g per day, 1.7 million deaths could be prevented annually in the world.

In nutrition, vitamins are of special importance, in particular, those that have antisclerotic, hypotensive (lowering blood pressure), lipotropic and antioxidant effects. Among these vitamins, it is possible to single out vitamins $B_{6,}$ PP, folic acid, vitamin E, carotene. In old age, it is necessary to constantly maintain the physiological level of vitamin C in the body, because it stimulates redox processes, normalizes metabolism, slows down the aging process, has a lipotropic effect, and promotes the assimilation of iron [7, 11, 13].

To compensate for vitamin deficiency, it is necessary to take care of a balanced diet, in some cases the use of vitamin complexes is recommended.

Data presented in the literature show that nutritional and drug therapy cannot be ruled out . During the last decades, there is a noticeable trend towards an increase in the population's demand for herbal remedies. Thus, according to the WHO, almost 80% of the world's population, within the framework of the primary health care system, mainly use traditional medicinal products of herbal origin.

The modern approach to the selection of components of plant origin in rational nutrition is based on the selection of such groups of medicinal plant raw materials, which, in combination with pharmacological correction drugs, are able to normalize the disturbed functions of various biological systems of the body - nervous, immune, hormonal; correct metabolic changes, contribute to the improvement of the general somatic condition of patients and increase their working capacity. The optimal methodological approach consists in the use of a phytotherapeutic formulation developed taking into account the latest ideas about the etiology and pathogenesis of the disease, as well as chemical and pharmacological data about the ingredients of the drug, the state of the raw material base and a number of other factors that meet the conditions of production in accordance with the requirements of regulatory and instructional materials WHO and EU [7, 11, 13, 20].

1.3. Current state of pharmacotherapy hypovitaminosis.

Hypovitaminosis is a pathological condition that develops as a result of a decrease in the content of a certain vitamin (or vitamins) in the body. Vitamin deficiency is accompanied by disorders of biochemical and physiological processes and the occurrence of specific pathology.

The main causes of hypovitaminosis: a decrease in the intake of a certain vitamin in the body as part of food products — exogenous hypovitaminosis; violation of assimilation of certain vitamins by the cells of the body (due to disorders of their absorption in the digestive tract or the inability of the biochemical systems of the body to include the vitamin in metabolic processes, in particular due to the presence of their structural competitors — antivitamins) — endogenous hypovitaminosis; increased removal of the vitamin from the body or its increased

utilization in biochemical and physiological processes (during breastfeeding, pregnancy, exhausting physical labor, extreme temperature conditions, severe infectious diseases, etc.) [7, 12, 20, 25].

To date, the understanding of enzyme vitamin deficiency as a coenzyme deficiency has developed. After finding out the fact of the presence of microelements in the structure of many vitamin-dependent coenzymes, it became clear that the symptoms of vitamin deficiency depend on the inefficiency of the entire apoenzyme complex — the activated vitamin ion, and not simply on the coenzyme deficiency. With hypovitaminosis, a deficiency of the apoenzyme — vitamin — mineral component complex is often noted. In addition, the importance of the interaction of the vitamins themselves has been established, e.g. folic acid, and vitamins — methyl donors. Antioxidant vitamins are synergists, e.g. E and A. Due to the similar interaction of several vitamins and microelements in one metabolic chain (e.g. vitamins B1, B2, PP, B15 and iron and copper during biological oxidation), the same symptoms of hypovitaminosis can "overlap" in the clinical picture of various diseases [8, 19, 27].

Thus, damage to the highly aerobic epithelial cells of the skin and mucous membrane of the mouth, pharynx and esophagus in the form of dermatitis, changes in the structure of hair and nails, glossitis, cheilitis, esophagitis, etc. are clinical manifestations of a deficiency of several vitamins and a deficiency of trace elements involved in biological oxidation [7, 13, 26].

Thanks to successes in understanding the interaction of indispensable nutritional factors and nature, G. vitaminologists moved from monovitamin therapy to the use of multivitamins and coenzyme forms of vitamins (eg cocarboxylase, riboflavin mononucleotide, flavinate, pyridoxal phosphate, etc.) and vitamin-mineral complexes.

Methods of assessing vitamin availability depend both on the nature of one or another vitamin, as well as on the purpose of the examination, the nature of the examined contingent, its number, and the selection of examinees. Methods of assessing vitamin availability: 1) clinical assessment — clinical manifestations,

symptoms and syndromes; 2) biochemical methods — concentration of vitamins in the blood, urinary excretion, activity of vitamin-dependent enzymes and the degree of their activation, accumulation of metabolic products, stress tests; 3) calculation of the content of vitamins in the diet - according to the tables of the chemical composition of food products, according to the menu, according to the data of questionnaires about the nature of daily or weekly nutrition, using the weight method of the dishes consumed. Clinical assessment of vitamin availability is fast, convenient, non-invasive, does not require technical support or financial costs, but is not always an accurate method, since latent (subclinical) metabolic disorders cannot be diagnosed. Calculating the content of vitamins in the diet is time-consuming, laborious, requires accurate data on the food history of the subject, the inaccuracies of this method can be caused by impaired absorption of consumed vitamins, storage features and the method of heat treatment of products. Biochemical methods of assessing security make it possible to establish the degree of saturation of the body with vitamins, therefore, the obtained results of the examinees are the most accurate and the most objective [11, 13, 20, 24].

1.4. Assortment of drugs for the hypovitaminosis use.

In recent years, approaches to ensuring the quality of herbal remedies at the modern level have been actively developed. This is evidenced by a significant number of WHO publications and draft documents on herbal medicines, discussions in the relevant chapters at the last two world congresses of the International Federation of Pharmacists (FIP, 2015) on the development of methods of analysis and approaches to the standardization of herbal preparations. Psychotherapy and psychiatric treatment have two main treatment options. Other treatment methods include social activities, mutual support and self-help. Prevention programs, as shown in FIP, are important to reduce depression.

Therefore, first of all, it is necessary to provide these patients with tonic and vitamin products.

Our research will be directed to the study of the range of tonic and vitamin products on Ukrane market.

In the table, represetted in Appendix A, plant-based preparations for treatment (with diseases: vegetative-vascular dystonia, psychosomatic disorders, chronic fatigue syndrome, neuroses) are presented, which include the following medicinal raw materials: rosehip fruits, peppermint leaves, blueberries, etc. [23, 30, 36, 37].

After analyzing the obtained data, it can be concluded that on the market of Ukraine, 75% of medicinal products of plant origin belong to the domestic manufacturer and 15% to the foreign manufacturer (Fig. 1.1).

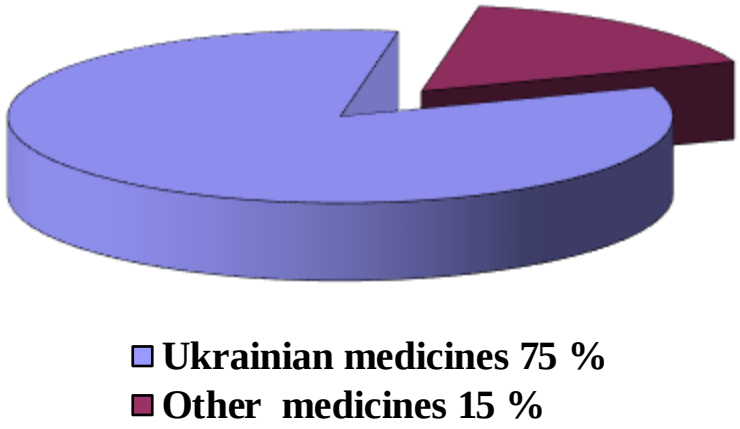
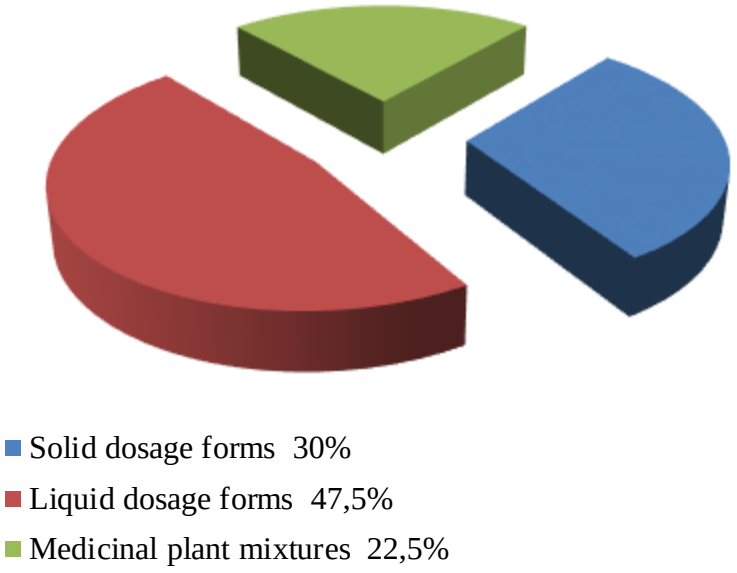


Figure 1.1. Assortment of medicines of domestic and foreign production

We also conducted a study of the assortment of individual dosage forms on the market of Ukraine. It was established that solid medicinal forms occupy 30%, liquid - 47.5%, medicinal plant collections make up only 22.5% of the drug market (Fig. 1.2).

According to the literature, the largest amount of vitamin C is found in rose hips, black currant leaves, blueberries, etc. [23, 36, 37].

It was decided to choose plants rich in ascorbic acid and a group of phenolic compounds as part of the collection: these are rose hips, leaves and fruits of black currant. All plants that are rich in ascorbic acid are called manganophiles because they contain a large amount of manganese.



Rice. 1.2 Assortment of dosage forms for hypovitaminosis use.

In 1944, it was proved that manganese plays a specific role in the biosynthesis of ascorbic acid. Novotelnov N.V. studied the relationship between ascorbic acid and flavonoids in rose hips and established that the stabilizing effect is due to flavonoids. Thanks to its oxidation-reduction properties, manganese plays the role of a regulator of the oxidation-reduction process in the cells of the human body. It was established that it activates peroxidase in the biosynthesis of a number of phenolic compounds [36, 37].

Plants that contain terpenoids and flavonoids are: peppermint leaves; contain tannins: blueberries and anthocyanins. But all these plants have in common that they are concentrators of vital elements such as: manganese, copper, chromium, vanadium. These plants selectively absorb the elements listed above. In most biochemical processes of the body, enzymes take part, the activators of which are trace elements: manganese, iron, copper, chromium, etc.

Based on the study of literature data, it is possible to conclude about the need to develop the composition and technology of a vitamin and tonic collection for rational nutrition for hypovitaminosis [23, 30, 36, 37].

Conclusions to chapter 1

1. Literary data on the peculiarities of nutrition were analyzed and summarized.
2. An analysis of the range of tonic and multivitamin medicines and the extemporaneous formulation of collections for hypovitaminosis use was carried out.

CHAPTER 2
RESEARCH OBJECTS AND METHODS

Medicinal substances approved for use in pharmaceutical and medical practice were used in the development of the composition of the extemporaneous collection prescription. The rationale for the composition of the collection is based on physical and chemical research methods [34-37].

2.1. Objects of research

The composition of the tonic and vitamin collection includes the following medicinal plant raw materials: rosehip fruits, blackcurrant leaves, peppermint leaves and dried blueberry fruits [9, 34-37].

Dog rose hips - Rosa canine L. Family - Rosaceae
Raw material - rosehip fruits (Fructus rozae) DFU 2.1, p. 249

External signs: Fruits length 0.7- 3 sm, diameter 0.6- 1.7 sm. with a hole at the top. Dry fruits are hard, the outer surface is shiny, less often matte. The inner surface has stiff bristly hairs. Nuts are small, oblong. Fruit color is orange-red. Nuts are light yellow. There is no smell. The taste is sour-sweet, slightly astringent.

Microscopy: Fragments of the outer epidermis of the hypanthium (fruit) can be seen on the microscopy of the fruit powder in the form of light yellow layers; fragments of the pulp of the fetus, which consist of parenchymal cells of the layers; fragments of fetal pulp consisting of parenchymal cells; numerous large unicellular hairs or their fragments [5, 18, 35].

Numerical indicators: ascorbic acid at least - 0.2%; humidity - no more than 15%; ash - no more than 3%; other parts of rose hips - no more than 2%; blackened, burnt, damaged fruits - no more than 0.5%; organic impurities - no more than 0.5%.

Quantitative determination: Determination of ascorbic acid content. Determination of the content of free organic acids [32, 34, 35].

Black currant leaf (Ribes Nigrum)

Currants have been known since ancient times, they were bred in Kyiv monasteries as early as the 11th century - bushes were transplanted from the forest into monastery gardens, adding variety to the meager monastery diet. In Europe, currants first became known as a medicine, and later they began to eat them. This plant has been domesticated for a long time, but it is interesting that in the Carpathian and Carpathian forests, currants are found in the wild.

Currant leaves are collected in June-July, only from the middle of the bush, leaving the lower and upper ones, they should be collected in dry weather, in the morning, when the dew dries up, or in the evening, when the heat subsides, and dried in the shade [1, 33, 34, 35].

Currant leaves and fruits are used for medicinal purposes.

The plant contains tannins, essential oils, flavonoids, is very rich in vitamin K, calcium, iron, magnesium, malic, tartaric, citric acids, boron and iodine.

Aqueous infusion of leaves is used for bladder stones and ischuria. Since the water infusion frees the body from uric acid, it is a good remedy for gout and rheumatism. Currant leaves stimulate the adrenal glands, so the infusion is effective for Addison's disease, anemia, and for colds as an antipyretic and anti-inflammatory agent. Currant is irreplaceable for vitamin deficiency and weakened immunity, it is part of tonic and strengthening medicinal preparations.

Preparation of aqueous infusion: 50 g of dry leaves per 1 liter of boiling water, infuse for 4 hours in a closed container, take 0.5 cups 4-5 times a day for inflammation of the bladder.

Contraindications: black currant is not recommended for patients with thrombophlebitis due to the large amount of vitamin K [1, 33, 34, 35].

Peppermint - Mentha piperita L. The hyacinth family is Lamiaceae

Raw material - peppermint leaves (Folia menthae piperitae) SPU 2.0, vol.3, p.395

External signs: Pieces of leaves of various shapes, up to 10 мм. and more with an admixture of flowers and buds. The edge of the mouth is serrated with uneven sharp teeth; the surface is bare, thin hairs are visible from below along the veins under the navel, and shiny golden-yellow and darker glands are visible all over the leaf plate. The color of the leaves is from light green to dark green. The smell is strong, aromatic. The taste is slightly burning, cooling [3, 28, 34, 35].

Microscopy: epidermal cells with strongly sinuous walls are visible on the upper and lower sides of the leaf. 2-4-celled hairs are visible along the veins and along the edge of the leaf. On the entire surface of the leaf there are cap hairs, which consist of a short unicellular stalk and an obovate head. In small recesses on both sides of the leaf, essential oil glands are visible, consisting of 8, less often 6 radially located excretory cells. *I:*

Numerical indicators: Essential oil - not less than 1%; humidity - not less than 14%; total ash - not less than 14%; ash, insoluble in a 10% solution of hydrochloric acid - no more than 6%; blackened leaves - no more than 8%; stems - no more than 10%; organic impurities - no more than 1% [3, 28, 34, 35].

Common blueberry - Vaccinium myrtillus L. The heather family is Vaccinium

Raw material - dried blueberries (Cormi Myrtilli) (SPU 2.0, vol. 3, p. 493).

External zones Low (15-40, less often 60 smhigh) branched, with sharply ribbed bare branches of bushes. The leaves are spirally arranged, almost sessile, continuous, ovate, elliptic, finely serrate on the edge, pointed at the top, light green above, paler below, bare or sparsely pubescent along the veins. Flowers regular on short peduncles, solitary; corolla greenish-pale with a pink tint. The fruit is a spherical black aka *berry:*

Chemical composition: carbohydrates - 5.3-7.4%; organic acids - 0.90-1.28%; ascorbic acid - 5-6 mg%; thiamine 0.045 mg%; riboflavin 0.08 mg%; nicotinic acid 2.1 mg%; carotene 0.75-1.6 mg%; tannins up to 2% [2, 10, 16].

2.2. Research methods

According to SPU 2.0, medicinal plant raw materials will be tested according to the following indicators:

- **Foreign impurities** (2.8.2). If there are no other indications in a separate article, tests are carried out for the content of extraneous impurities. Unless otherwise specified in a separate article, the content of foreign impurities should not exceed 2%. Medicinal plant raw materials, which can be falsified, must be subjected to appropriate specific tests.
- **Loss in mass during drying** (2.2.32). if there are no other indications in a separate article, determine the loss in mass during drying.
- **Water** (2.2.13). For medicinal plant raw materials with a high content of essential oils, water is determined instead of mass loss during drying.
- **Pesticides** (2.8.13). Medicinal plant raw materials must meet the requirements for the content of residual quantities of pesticides. At the same time, the individual characteristics of the plant are taken into account, in which medicinal product it will be used, and, if available, comprehensive information on the processing of this series of plant raw materials.
- **Microbiological purity.** Recommendations on the microbiological purity of products consisting of only one or several types of medicinal plant raw materials are given in the article "Microbiological purity of medicinal products" (5.1.4)

In necessary cases, medicinal plant raw materials must withstand other tests [34, 35].

Technological parameters of raw materials

The main technological parameters of plant raw materials are moisture content, content of extractive substances, specific, volumetric and bulk mass of raw

materials, porosity, porosity and free volume of the layer of raw materials, size and surface of plant tissue particles, flowability, angle of natural slope, etc.

The specific, volumetric and bulk mass allow to determine the porosity, porosity and free volume of the layer, which makes it possible to identify the required ratio of raw materials and extractant. The above methods are described in the literature, and we used them in the [34, 35].

Specific mass

The specific mass **(** d_y**),** which is the ratio of the mass of completely dry crushed raw materials to the volume of plant tissue, calculated according to the formula

$$d_y = \frac{P \times d_ж}{P - G + F}, g/sm^3, \text{ where}$$

P - mass of completely dry crushed raw materials, g,

G - mass of the pycnometer with water, g,

F - mass of the pycnometer with water and raw materials, g,

$d_ж$- specific mass of water, $г/sm^3$

About 5,0 г(exact weight) of crushed raw materials are placed in a pycnometer with a capacity of 100 ml, filled with distilled water to $2/3$the volume and kept on a water heater for about 1.5-2 hours with periodic stirring in order to completely release air from the raw materials. Then the pycnometer is cooled to 20 °C ^{0}C, the volume is brought up to the mark with distilled water. In this way, the mass of the pycnometer with raw materials and water is determined. The mass of the pycnometer with water is determined in advance [34, 35].

Volumetric mass

Volumetric mass **(** d_o**)** is defined as the ratio of the mass of non-shredded raw materials with natural or added moisture to its full volume, which includes pores, cracks and capillaries filled with air. The calculation follows the formula:

$$d_o = \frac{P_o}{У_o}, g/sm^3, \text{ where}$$

P_o- mass of unshredded raw materials with natural or added moisture, g,

$У_o$- volume occupied by raw materials, sm^3

Determination of bulk mass of a substance.

About 10,0 г(exact weight) of unground raw material is quickly immersed in a measuring cylinder with a liquid (distilled water) and the volume is determined. The volume occupied by the raw material is determined by the volume difference in the measuring cylinder [34, 35].

Bulk mass

Bulk mass ***(*** $d_н$***)*** is defined as the ratio of the mass of crushed raw materials with natural or added moisture to the total volume occupied by the raw materials together with the pores of the particles and the free volume between them. The calculation follows the formula:

$$d_н = \frac{P_н}{У_н}, g/sm^3, \text{ where}$$

$P_н$- mass of crushed raw materials with natural or added moisture, g,

$У_н$- volume occupied by raw materials, sm^3.

Determination of the bulk mass of raw materials. The crushed raw material is loaded into the measuring cylinder, shaking it slightly until leveling, and the total volume occupied by the raw material is determined. Then the raw materials are weighed.

After determining the specific, bulk, and volumetric mass, you can calculate the porosity, porosity of the raw material, and the free volume of the layer [34, 35].

Porosity.

Porosity of raw materials indicates the size of the internal free space of the raw material particles and is defined as the ratio of the difference between the specific and volumetric mass to the specific mass. The porosity of the raw material is calculated according to the formula:

$$P_с = \frac{d_у - d_о}{d_у}, \text{ where}$$

d_y- specific mass of raw materials, g/sm^3,

d_o- volume mass of raw materials, g/sm^3.

The free volume of the layer

The free volume of the layer means the relative volume of free space in a unit of raw material (internal free space of particles and between particles). It is calculated as the ratio of the difference between the specific and bulk mass to the specific mass:

$$y = \frac{d_y - d_н}{d_y}, \text{where}$$

$d_н$- bulk mass of raw materials, g/sm^3.

d_y- specific mass of raw materials, g/sm^3.

Diminutiveness

The granularity of raw materials is characterized by the size, surface and degree of tissue destruction. This indicator becomes necessary when assessing the quality of preparation of raw materials for extraction and when calculating mass transfer constants

To determine the average particle size, a sieve analysis of the raw material is carried out, based on the results of which ***the weighted average diameter*** **(particle size) is determined according to the formula:**

$$d = \frac{a_i \times d_i}{100}, \text{ where}$$

a_i- capacity of each fraction, %,

d_i- average particle size of each fraction, mm,

and - the number of fractions.

Determination of the weighted average diameter of the particles.

The raw material sample (100,0 г) is divided into fractions, sifting it through a set of sieves on an AR-2B vibrator for 20 minutes. Determine the capacity of each fraction in percent and the average diameter of each fraction. According to the results of the sieve analysis, the weighted average particle size is determined. The number

of fractions must be at least 6. The particle sizes of the obtained fractions are limited by the size of the holes on the sieve [34, 35].

Determination of extractive (lipophilic) substances.

5.0 g (precisely weighed) of finely ground raw material is placed in a 100 ml conical flask with a ground stopper. Pour 25 ml of hexane or petroleum ether 70-100 ^{0}C, extract for about 1.5 hours. The extract is filtered through a paper filter, after which 10 ml of it is placed in a dried and weighed porcelain cup. It is evaporated on a water heater, and then kept in a drying cabinet for about 30 minutes at a temperature of 100-105 ^{0}C. Cool in a desiccator and weigh.

The content of extractable lipophilic substances is calculated according to the formula:

$$X, \% = \frac{в \times 25 \times 100}{а \times 10}, \text{ where}$$

and - weight of completely dry crushed raw material, g,

c - weighing the cup, g.

This technique allows you to significantly reduce the time of raw material analysis [34, 35].

Physico-chemical research methods

Potentiometric determination of pH

pH is a number that conventionally characterizes the concentration of hydrogen ions in aqueous solutions. In practice, pH is determined experimentally.

Potentiometric determination of pH is carried out by measuring the potential difference between two corresponding electrodes immersed in the tested solution: one of the electrodes is sensitive to hydrogen ions (usually a glass electrode), the second is a reference electrode (for example, a saturated calomel electrode) [34, 35].

Total ash.

Determination of total ash is carried out in accordance with SPU 2.0.

Weight loss during drying

The loss in mass during drying is determined by one of the following methods in SPU 2.0 and expressed as a percentage (mass/mass) [34, 35].

Conclusions to chapter 2

The characteristics of the active pharmaceutical ingredient (API), auxiliary substances, and the range of methods necessary for the rational selection of the extemporaneous vitamin herbal mixture composition were presented.

CHAPTER 3
DEVELOPMENT OF COLLECTION TECHNOLOGY IN PHARMACY CONDITIONS

3.1. Technological parameters of raw materials

In order to develop the optimal technology of collections in modern packaging - filter bags, we studied the technological properties of the raw materials that are part of the studied collection: raw material pulverization, volumetric weight, porosity, transparency, moisture content, content of extractive substances. Determination of these parameters determines the technological properties of the raw materials that are part of the tonic collection and the qualitative and quantitative content of substances that will be transferred to the aqueous extract as a result of extraction.

Enterprises of the medical and microbiological, food, perfumery and cosmetic industries annually process hundreds of thousands of tons of medicinal plant raw materials to obtain biologically active substances. Different parts of plants (grass, leaves, flowers, fruits, roots) differ in mechanical strength, anatomical structure, and shape. The processed material is characterized by certain technological properties that must be taken into account when grinding the raw material, transporting it, calculating the extraction process and the ratio of phases. Our further research will be directed to the study of these properties [23, 30, 36] .

The granularity of the raw material characterizes the size of the parts and the area of extraction. In this regard, it determines both the completeness of extraction and the homogeneity of mixing. The quality of the water extracts obtained as a result of extraction determines the content of active and extractive substances.

The main task of grinding raw materials can be considered to damage its structure and increase the area of extraction. When the structure of the raw material is damaged, part of the cells opens and the contents of the hidden cells are easily washed out with an extractant. As a result, during the extraction of raw materials, there is dissolution and rapid washing out of substances from damaged cells and slow diffusion of soluble substances from undamaged cells.

The relative amount of substances that went into solution during the period of rapid extraction is an important technological characteristic of the raw material - the leaching coefficient and is a parameter that determines the entire extraction process. The completeness of the extraction is also affected by the volumetric weight, as well as the porosity and porosity of the raw material. In addition, the definition of these indicators allows you to establish the mass of raw materials that can be placed in a filter bag. Therefore, our further research was aimed at determining these indicators [2, 5, 28, 33, 36].

3.2 Determination of specific, volumetric, bulk mass, porosity and porosity of individual plants

Methods for determining the specific, volumetric, bulk mass, porosity and porosity of plants have been developed and presented in the literature [34-36]. The methods are given in Chap. 2, were used by us in this work.

Determination of specific mass of raw materials . Approximately 5,0 г(exact weight) of crushed raw materials was placed in a pycnometer with a capacity of 100 ml, then filled with distilled water to $2/3$the volume and kept on a water heater for about 1.5-2 hours with periodic stirring in order to completely release air from the raw materials. Then the pycnometer was cooled to 20 °C ^{0}Cand the volume was brought up to the mark with distilled water. In this way, the mass of the pycnometer with raw materials and water was determined. The mass of the pycnometer with water was determined in advance. Calculations were made according to the formula:

$$d_y = \frac{P \times d_ж}{P - G + F}, g/sm^3, \text{where.}$$

R - mass of completely dry crushed raw materials, g,

G - mass of the pycnometer with water, g,

F - mass of the pycnometer with water and raw materials, g,

$d_ж$ - specific mass of water, g/sm^3.

The results of the study are presented in table. 3.1.

Table 3.1

Specific mass of raw materials

The name of the raw material	**Specific mass, g/sm^3**
Rosehip fruits	0.7608
Currants of black leaves	0.7672
Mint pepper leaves	0.7527
Blueberry fruits	0.7695

Determination of volumetric mass of raw materials. About 10,0 г(exact weight) of unground raw material was quickly immersed in a measuring cylinder with a liquid (distilled water) and the volume was determined. The volume occupied by the raw material was determined by the volume difference in the measuring cylinder. The calculation is carried out according to the formula:

$$d_o = \frac{P_o}{y_o}, g/sm^3.\text{where}$$

P_o- mass of unshredded raw materials with natural or added moisture, g,

y_o- volume occupied by raw materials, sm^3.

The results of the study are shown in the table. 3.2.

Table 3.2

Volumetric mass of raw materials

The name of the raw material	**Volumetric mass, g/sm^3**
Rosehip fruits	0.7010
Currants of black leaves	0.5415
Mint pepper leaves	0.5822
Blueberry fruits	0.5503

Determination of porosity of raw materials. Porosity of raw materials indicates the size of the internal free space of the raw material particles and is defined as the ratio of the difference between the specific and volumetric mass to the specific mass. The porosity of the raw material is calculated according to the formula:

$$П_с = \frac{d_у - d_о}{d_у}, \text{ where}$$

$d_у$- specific mass of raw materials, g/sm^3.
$d_о$- volume mass of raw materials, g/sm^3.

The results of the calculations are shown in Table 3.3

Table 3.3

Porosity of raw materials

The name of the raw material	**Raw material porosity, g/sm^3**
Rosehip fruits	0.1015
Currants of black leaves	0.2937
Mint pepper leaves	0.2289
Blueberry fruits	0.2813

Determination of the bulk mass of raw materials . Crushed raw materials were loaded into the measuring cylinder, slightly shaken until leveled, and the total volume occupied by the raw materials was determined. Then the raw materials were weighed. The calculation was carried out according to the formula [5, 53, 54] :

$$d_н = \frac{P_н}{у_н}, \ g/sm^3, \text{ where}$$

$Р_н$- mass of crushed raw materials with natural or added moisture, g,

$У_н$- volume occupied by raw materials, sm^3

The results of the experiment are shown in table. 3.4.

Table 3.4

Bulk mass of raw materials

The name of the raw material	**Bulk mass, g/sm^3**
Rosehip fruits	0.4750
Currants of black leaves	0.1351
Mint pepper leaves	0.1675
Blueberry fruits	0.1923

Determination of porosity of raw materials. The porosity of the layer determines the amount of free space between parts of the plant material and is calculated as the ratio of the difference between the volume and bulk mass to the volume mass according to the formula:

$$\Pi_{\text{сл}} = \frac{d_{\text{о}} - d_{\text{н}}}{d_{\text{о}}}, \text{ where}$$

$d_{\text{о}}$- volume mass of raw materials, g/sm^3.

$d_{\text{н}}$- bulk mass of raw materials, g/sm^3.

The results of the calculations are shown in Table 3.5.

Table 3.5

The porosity of the raw material layer

The name of the raw material	**Layer porosity, g/sm^3**
Rosehip fruits	0.3081
Currants of black leaves	0.7502
Mint pepper leaves	0.7141
Blueberry fruits	0.6614

The established parameters of the plants are qualitative parameters of the preparation technology and allow to control and evaluate the technological parameters of the preparation of the collection, as well as the yield of extractive and active substances [34-36].

Specific and volumetric mass, porosity and porosity determine: the volume occupied by dry and swollen raw materials; necessary ratios of raw materials and extractant; changes that occur in the volume of internal and external juice and the concentration of substances in internal and external juice with changes in volume.

When swelling, the mass of raw materials increases by 1.5-2 times, therefore, the mass of the collection in the filter bag should not exceed 1/3 of its volume, which is 5 sm^3, or 1,5 гby 1 filter bag.

On the basis of the conducted research, it was established that the maximum loading of a filter pack measuring 5×4 cm is 16 sm^3.

3.3 Study of the method of insisting on the quality of the water extract of the collection

In this case, the collection is a mixture of several types of dried, crushed medicinal raw materials. The degree of grinding of each raw material must meet the requirements of regulatory documentation for a specific medicinal product. In this case, grass and leaves should have a degree of grinding of 4-6 mm, fruits 0.5 mm. The raw materials were packaged in filter bags. Water extracts were prepared from them using the following technology: infusion in a thermostat for 12 hours; insisting in a thermostat for 6 hours; processing the collection with boiling water and insisting until cooling (20-30 min) [34-36].

Taking into account the fact that medicinal plant collections are a semi-finished product, that is, an intermediate medicinal form, the final product of which is aqueous extracts, which are prepared by patients at home, our further research was directed to the study of the influence of the method of insisting on the quality of aqueous extracts, that is, preparation at home . In addition, it is necessary to take into account that aqueous extracts from medicinal plant collections, by their nature, are subject to intense microbial contamination, as they are a good environment for microorganisms. It is the mode of production of aqueous extracts from raw materials that affects the contamination of this dosage form, as well as the manifestation of antimicrobial and fungicidal action [34-36].

- infusion in a thermostat for 12 hours (before this, the raw materials were washed with cold and hot water, drained and transferred to a thermos with boiling water);
- insisting in a thermostat for 6 hours;
- processing the collection with boiling water and insisting until cooling (20 min).

The results of the research are presented in the table. 3.7.

Table 3.6

The influence of the infusion mode on the quality of water extracts from the collection

No	Mode of infusion	Organoleptic indicators	Extractive substances, %	Essential oil content, %
1	12 hours in the thermostat	Dark brown coloring, the solution is transparent	70,04 ±1.22	1.95 ± 0.06
2	6 hours in the thermostat	Brown color with a red tint, slightly cloudy.	59,11 ±1.15	1.71 ±0.08
3	Treatment with boiling water and infusion for 20 minutes until cooling.	Saturated yellow-red color, transparent.	44,71 ±0.95	1.52 ±0.06

The quality of water extracts was evaluated according to the following parameters: organoleptic indicators, the content of extractive substances and the content of essential oil. Analyzing the quality of the obtained water extracts in the studied regimes, it was established that the color and transparency of the water extracts differ significantly from each other, depending on the method of infusion.

So, aqueous infusions obtained by method 3 (treatment with boiling water, and infusion for 20-30 minutes before cooling): were transparent with a yellow-red color.

Aqueous infusions prepared according to method 2 (in a thermostat for 6 hours) had a brown color with a slight red tint and were slightly cloudy [34-36].

Infusions prepared according to method 1 (in a thermostat for 12 hours and pre-washed with cold and hot water) had a dark brown color and were transparent.

Quantitative indicators in studied samples 1 and 2 changed slightly (except for the 3 method of infusion), which indicates that the mode of infusion affects the quantitative output of active substances and contributes to an increase in the output of accompanying substances (an increase in the output of extractive substances in aqueous extracts of the obtained according to method 1 and 2).

Changes were observed in water extracts prepared according to methods 1 and 2 after 2 days (on the 3rd day), namely: increased turbidity and a change in color, which indicates the development of microorganisms. This proves that water extracts obtained by these methods meet the Requirements for the manufacture of non-sterile medicinal products in pharmacies [34-36]. According to these requirements, water hoods are kept for 2 days.

So, it has been experimentally proven that the production of aqueous extracts from the collection according to methods 1 and 2 ensures the optimal concentration of active substances, and the use of another method 3 leads to a reduction of active substances in aqueous extracts.

Based on the conducted research, it can be concluded that the maximum output of extractive substances is observed from raw materials packaged in filter bags and manufactured according to method 1 or 2. This, in turn, indicates the advantage of this type of packaging over cardboard boxes.

It should be noted that the collections in disposable filter bags are a dosed dosage form, the production of which is automated in pharmacies, and allows to increase the period of use and storage of this dosage form [34-36].

3.4 Study of the microelement composition of raw materials

This collection is recommended for use as a tonic and multivitamin for hypovitaminosis use. The collection includes: rosehip fruits, blackcurrant leaves, peppermint leaves, dried blueberries.

According to the literature, medicinal plant raw materials such as rose hips and blueberries, mint leaves are concentrators of vital elements necessary for human

life. The above-mentioned plants are able to selectively absorb manganese, copper, chromium, vanadium, etc. [34-36].

The main active substances of blackcurrant leaves and rosehip fruits are manganese and ascorbic acid, which is used in pharmacy for manganese deficiency and avitaminosis. The active substances of blueberries are tannins and anthocyanins, which are used for copper, manganese and chromium deficiency. Mint leaves contain terpenoids and flavonoids, and this raw material is used as an antispasmodic and choleretic agent.

Thanks to its oxidation-reduction properties, manganese plays the role of a regulator of the oxidation-reduction process in the cells of the human body. It was established that it activates peroxidase in the biosynthesis of a number of phenolic compounds. In most biochemical processes of the body, enzymes participate, the activators of which are manganese, iron, copper, chromium, etc. [34-36].

Thus, it was of interest to study the microelement composition of medicinal plant raw materials included in the collection, namely, rosehip fruits, blueberry shoots, and mint leaves.

The study of the elemental composition of individual components of the collection allowed us to confirm the correctness of the composition of the collection from the standpoint of pharmacological activity and rich microelement composition. This extemporaneous collection can be recommended to patients as a tonic and vitamin collection.

3.5. Technology of tonic and vitamin collection

Today, the pharmaceutical market of Ukraine is characterized by a growing need for herbal preparations against the background of a decrease in natural reserves of medicinal plant raw materials, which is caused by irrational use. Increasing the efficiency of LRS use can be achieved by improving the technology of drug production, waste utilization, expanding the range of dosage forms and increasing the volume of their production.

One of the stages of our work was the development of collection technology, which includes several stages, each of which has a number of features and requires scientific justification. We determined the main technological characteristics of plant raw materials, which are included in the tonic collection: raw material pulverization, volumetric weight, porosity, porosity, content of extractive substances. The determination of these parameters determines the technological properties of the raw materials included in the collection. In addition, the determination of these indicators allows to establish the mass of raw materials that can be placed in the filter bag [34-36].

The theoretical justification of the collection technology was carried out according to the technological scheme presented in the Methodological recommendations "Requirements for the manufacture of non-sterile medicinal products in pharmacies". It includes a number of operations that largely determine the activity of the active substances included in the saliva collection. The main technological stages are: sanitary preparation of production, preparation of raw materials (shredding and sieving), preparation of collection (mixing of raw materials), packaging, packaging, preparation for release.

Conclusions to chapter 3

1. The specific, bulk and volumetric mass, porosity and transparency of the raw material layer were studied .
2. A rational method of API extraction was chosen. It has been proven that the preparation of a water extract of the collection placed in a filter bag by pouring boiling water with subsequent infusion for 6 or 12 hours allows you to prepare an infusion with a sufficient content of biologically active substances.
3. The trace element composition of blueberries, rose hips and mint leaves was studied, which allowed to confirm the correctness of the composition of the collection.
4. A rational technology of tonic and vitamin collection for strengthening health for hypovitaminosis use has been developed.

GENERAL CONCLUSIONS

1. Analyzed and summarized literary data on the peculiarities of nutrition for hypovitaminosis use.
2. A study of the assortment of tonic and multivitamin medicinal products of plant origin recommended for use in the elderly was conducted.
3. The composition and technology of tonic, vitamin collection for hypovitaminosis use is theoretically and experimentally substantiated.
4. The influence of the technological parameters of the collection raw materials on the yield of extractive substances was studied. It was established that the preparation of a water extract from the collection placed in a filter bag by pouring boiling water followed by infusion for 6 and 12 hours (storage for 2 days) allows you to prepare an infusion with a sufficient content of biologically active substances necessary as a tonic and vitamin collection.
5. The trace element composition of the raw materials included in the collection was studied. It is shown that the use of a filter pack allows to expand the assortment of domestic herbal preparations (collections), for which it is more rational to use the resources of medicinal plant raw materials of Ukraine.
6. On the basis of the conducted studies, the collection containing as API the fruits of rose hips, blackcurrant leaves, peppermint leaves, and blueberry fruits can be recommended for further research in order to expand the range of modern LF intended for hypovitaminosis use.

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APPLICATIONS

Appendix A

Assortment of drugs for the treatment of psychosomatic disorders, vegetative-vascular dystonia, chronic fatigue syndrome

No	Name	Composition	Pharmaceutical group	Medicinal form	Producer
1	Soothing mixture No. 2	1 g of the collection contains: motherwort grass (Leonuri herba) 400 mg, hop cones (Lupuli flos) 200 mg, **peppermint leaves** (Menthae piperitae folia) 150 mg, valerian rhizomes with roots (Valerianae rhizomata cum radicibus) 150 mg, licorice roots (Glycyrrhizae radices) 100 mg.	Sedatives	Powder	PJSC "Liktravy", Ukraine
2	Carfised	motherwort herb 4 г, hop fruit (cones) 3 г, hawthorn fruit 3 г, marsh flower herb 3 г, lemon balm herb 3 г, rhizomes and roots of valerian 2 г, **motherwort herb2 г**	Sedatives	Tincture	Municipal enterprise "Luhansk Oblast "Pharmacy", Pharmaceutical factory, Ukraine
3	Climapin®	hawthorn fruits - 3.0 г, hop fruit - 2.0 г, nettle grass - 1.5 г, nettle leaves - 1.0 г, sage leaves - 1.5 г, **motherwort grass - 0.5 г**, belladonna leaves or grass -0.5 г	Sedatives	Tincture	JSC "Efekt" for "Iris Laboratory" LLC, Kharkiv, Ukraine

4	Monomache	common rowan juice alcoholized - 8.0 г, black rowan juice alcoholized - 10.0 г, apple juice alcoholized - 8.0 г, roots and rhizomes of licorice - 0.1 г, rhizomes of yarrow -, 0.012 г**St. John's wort grass - 0.065 г, motherwort grass - 0.052 г, peppermint leaves - 0.081 г**, yarrow grass - 0.075 г, pine buds -0.02 г	Drugs that "tone" the central nervous system	Balm for internal use	Subsidiary enterprise "Agrofirma "Yan" of private enterprise "Yan" for "Ukrainian Pharmaceutical Company" LLC, Kyiv, Ukraine
5	Song Hao Dai Bo Tin	ginseng root (Panax Ginseng) - 42 mg; eucommia ulmoides (Eucommia Ulmoides) - 21 mg; Chinese angelica (Angelica Sinesis) - 21 mg; poria mushroom (Poria cocos) - 21 mg; Ligusticum Wallichii - 21 mg; medicinal morinda (Morinda officinalis) - 21 mg; Rosehip smoothed (Rosa Levigata) - 21 mg; licorice (Glycyrrhiza glabra) - 21 mg; deer antlers (Cervi parvum) - 42 mg; Rehmannia chinensis (Rehmania chinensis) - 21 mg; dogwood (Fructus Cornus officinalis) - 21 mg; bidentata blume - 21 mg; Polygonum multiflorum - 21 mg; Atractylo des macr. - 21 mg; Chinese cinnamon (Cinnamo mum cassia) - 21 mg; desert cistanche (Cistanche deserticola) - 21 mg	Drugs that "tone" the central nervous system	The extract is liquid	Pharmaceutical company "FITO PHARMA Co.Ltd", Vietnam
6	Phytoflox	linden flowers - 20.0 г, black elder flowers - 20.0 г, **peppermint leaves - 20.0 г**, chamomile flowers - 20.0 г, **rose hips fruits -20.0 г**	Biogenic stimulants	Medicinal tea	Scientific and Production Pharmaceutical Enterprise "Forces of Nature" LLC, Ukraine

7	Herbion® Soothing Drops	roots of valerian - 15.0 г, cones of ordinary hops - 6.0 г, **leaves of peppermint - 1.0 г**, leaves of lemon balm -1.0 г	Sedatives	Drops for internal use	"KRKA dd, Novo mesto", Slovenia
8	Darvilol	ethyl ether of alpha-bromosovaleric acid - 2.0 г, phenobarbital - 1.826 г, **peppermint oil -0.142 г**	Sedatives	Drops	CJSC "Pharmaceutical firm "Darnytsia", Kyiv, Ukraine
9	Soothing Collection	**33,3 гpeppermint leaves,** 33,3 гtrefoil leaves, 16,7 гrhizomes with valerian roots, 16,7 гhop cones	Sedatives	Gathering	CJSC "Pharmaceutical Factory "Viola", Zaporizhzhia, Ukraine
10	Sedative-Left Collection No. 2 (Sedative)	motherwort grass 0,4 г, hop cones 0,2 г, **peppermint leaves 0,15 г**, valerian rhizomes with roots 0,15 г, licorice roots0,1 г	Sedatives	Gathering	CJSC "Liktravy" Zhytomyr, Ukraine
11	Soothing Collection No. 2	**15 гpeppermint leaves,** 15 гrhizomes with valerian roots, 10 гlicorice root, 40 гmotherwort grass, 20 гhop cones	Sedatives	Gathering	CJSC "Pharmaceutical Factory "Viola", Zaporizhzhia, Ukraine
12	Collection Is Satisfactory	**20% peppermint herb** (Mentha riperita herba), **10% St. John's wort herb** (Hypericum perforatum herba), 17% lemon balm herb (Melissa officinalis herba), 13% valerian roots (Valeriana officinalis radix), 16% chamomile flowers (Chamomilla recutita flos), 16% hop cones (Humulus lupulus flos)	Homeopathic remedies	Gathering	"Leros s..ro", Czech Republic
13	Korvaldin®	100 ml of solution contain: ethyl ether of alpha-bromisovaleric acid - 2.0 г, phenobarbital - 1.8 г, **peppermint oil - 0.14 г**, hop oil -0.02 г	Sedatives	Drops for internal use	OJSC Farmak, Kyiv, Ukraine

14	Corvalol®	100 ml of solution contain: ethyl ether of alpha-bromisovaleric acid - 2.0 г, phenobarbital - 1.826 г, **peppermint oil -0.142 г**	Sedatives	Drops for internal use	OJSC Farmak, Kyiv, Ukraine
15	CORVALOL® N	100 ml of solution contain: ethyl ether of a-bromosovaleric acid - 2.0 г, **solution of menthol** in menthyl ether of isovaleric acid - 5.5 г, mint oil - 0.142 г, hop oil - 20.0 mg	Sedatives	Drops for internal use	OJSC Farmak, Kyiv, Ukraine
16	Corvaltab	1 tablet contains: ethyl ether of alpha-bromosovaleric acid - 8.2 mg, phenobarbital - 7.5 mg, **peppermint oil 0.58 mg**	Sedatives	Tablets	"Pharma Start" LLC, Kyiv, Ukraine
17	Lixon	100 ml of solution contain: zopiclone - 0.075 г, motherwort tincture - 43.5 ml, hop cones tincture - 6.5 ml, **peppermint oil -0.14 г**	Sleep aids	Solution	Branch of LLC "Experimental Plant "GNCLS" for LLC "Experimental Plant "GNCLS", Kharkiv/ Dnipropetrovsk, Ukraine
18	Menovalen	1 capsule contains: lipophilic valerian complex 0,050 г(50 mg) (based on dry matter), **lipophilic peppermint complex 0,025 г(25 mg) (based on dry matter)**	Sedatives	Capsules	CJSC "Borshchagivskyi HFZ", Kyiv, Ukraine
19	Persen®	1 tablet contains: valerian extract - 50.0 mg, lemon balm extract - 25.0 mg, **peppermint extract - 25.0 mg**	Sedatives	Coated tablets	"Lek" Pharmaceutical Company dd, Slovenia
20	Persen® Forte	1 capsule contains: valerian extract - 125.0 mg, lemon balm extract - 25.0 mg, **peppermint extract - 25.0 mg**	Sedatives	Capsules	"Lek" Pharmaceutical Company dd, Slovenia

21	Relaxil	1 capsule contains: valerian dry extract 0,125 г, **peppermint dry extract 0,025 г**, lemon balm dry extract 0.025 g	Sedatives	Capsules	CJSC "Kyiv Vitamin Plant", Kyiv, Ukraine
22	Sedavit®	1 tablet contains: Sedavita thick extract in terms of dry substance - 0,17 г(170 mg) (Sedavita thick extract is obtained from rhizomes with valerian roots, hawthorn fruits, **St. John's wort, peppermint leaves,** hop cones), pyridoxine hydrochloride (vitamin B6) in terms of 100% substance - 0,003 г(3 mg); nicotinamide (vitamin PP) in terms of 100% substance - 0,015 г(15 mg)	Sedatives	Tablets	OJSC "Kyivmedpreparat", Kyiv; JSC "Halychpharm", Lviv, Ukraine
23	Sedavit®	100 ml of the drug contain: Sedavit, a liquid extract (1: 4.5) from a mixture of LRS: rhizomes with valerian roots, hawthorn fruits, **St. John's wort, peppermint leaves,** hop cones - 94 ml, pyridoxine hydrochloride (vitamin B6) - 0,06 г, nicotinamide (vitamin PP) -0,3 г	Sedatives	Solution	JSC "Halychpharm", Lviv, Ukraine
24	Sedacen Forte	1 capsule contains: valerian extract - 125.0 mg, **peppermint extract - 25.0 mg,** lemon balm extract - 25.0 mg	Sedatives	Capsules	JV "Sperko Ukraine", Vinnytsia, Ukraine
25	Sedaflox	100 гtea contains: black elder flowers - 15.0 г, **St. John's wort grass - 10.0 г**, valerian rhizomes with roots - 20.0 г, **peppermint leaves - 15.0 г**, motherwort grass - 20.0 г, hawthorn fruits -20.0 г	Sedatives	Medicinal tea	Scientific and Production Pharmaceutical Enterprise "Forces of Nature" LLC, Kharkiv, Ukraine

26	Tone	100 ml of elixir contain: rhizomes of common yarrow - 0.15 г, herbs of yarrow - 0.05 г, **herbs of peppermint - 0.07 г**, rhizomes with roots of Eleutherococcus - 0.07 г, herbs of burkun medicinal - 0.05 г, rhizomes with roots of Echinacea purpurea - 0.06 г, fruits of hawthorn -0.05 г	Drugs that "tone" the central nervous system	Elixir	CJSC "Liki Kirovohradshchyna" for the Private Research and Production Small Enterprise "Inkopmark", Kirovohrad, Ukraine
27	Florised-Health	1 capsule contains: dry sedative extract collection (sedative collection contains: nettle grass, common hop cones, **peppermint leaves,** rhizomes with valerian roots, licorice roots and rhizomes) 311.5 mg	Sedatives	Capsules	LLC "Pharmaceutical company "Zdorovya", Kharkiv, Ukraine
28	Immunophyt	100 гthe collection contains: rhizomes of ayru - 7.0 г, rhizomes and roots of oleander - 14.0 г, rhizomes with roots of leuzea - 17.0 г, roots of dandelion - 14.0 г, roots of licorice - 14.0 г, **fruits of rose hips - 17.0 г**, rhizomes with roots of Echinacea purpurea - 17.0 g	Drugs that "tone" the central nervous system	Gathering	"Aim Scientific and Production Pharmaceutical Company" LLC, Kharkiv, Ukraine
29	Vitagren	100 ml of balm contain water-alcohol extracts from: **rosehip fruits - 0.8 г**, dogwood grass - 0.8 г, elderflowers - 0.4 г, mulberry silkworm grenadine - 0.1 г, propolis - 0.5 g	Various means that stimulate metabolic processes	Balm	"Panaceya" LLC, Zaporozhye, Ukraine
30	Sviatohor®	100 ml of the drug (elixir) contain: water-alcohol extract (1:180), obtained from a mixture of medicinal plant raw materials: rhizomes of	Drugs that "tone" the	Elixir	CJSC "Kremenchutsk Liquor and Vodka Factory"; SE

		yarrow 0,075 г, rhizomes with the roots of Eleutherococcus 0,055 г, rhizomes with the roots of Echinacea purpurea 0,05 г, rhizomes with the roots of amaranth 0,01 г, rhizomes of foxglove 0,07 г, licorice roots 0,045 г, **peppermint leaves 0,025 г**, burkun herb 0,045 г, bitter wormwood herb 0,025 г, hawthorn fruits 0,04 г, **rosehip fruits 0,05 г**, dill fruits0,02 г	central nervous system		"Mezhyritsky Vitamin Plant" JSC "Ukrmedprom"; Teteriv Liquor and Vodka Plant LLC for Fitan LLC, Kyiv, Ukraine
31	Imuno-Ton®	100 ml of syrup contain: liquid eleutherococcus extract - 16.6 г, tinctures of rhizomes with purple echinacea roots - 8.0 г, **St. John's wort tinctures -8.3 г**	Drugs that "tone" the central nervous system	Syrup	JSC "Halychpharm", Lviv, Ukraine
32	Collection Calm-Left	**20% peppermint herb** (Mentha riperita herba), **10% St. John's wort herb** (Hypericum perforatum herba), 17% lemon balm herb (Melissa officinalis herba), 13% valerian root (Valeriana officinalis radix), 16% chamomile flower (Chamomilla recutita flos), 16% hop cones (Humulus lupulus flos)	Homeopathic remedies	Gathering	"Leros s..ro", Czech Republic
33	Doppel Hertz® Energo-Tonic	100 ml contain: nicotinamide 25 mg, calcium pantothenate 16 mg, thiamine hydrochloride (vitamin B1) 5 mg, riboflavin (vitamin B2) 5 mg, pyridoxine hydrochloride (vitamin B6) 5 mg, rutoside trihydrate 2 mg, folic acid 0.3 mg, manganese (II) sulfate monohydrate 0.1 mg, copper (II) sulfate pentahydrate 0.1 mg,	Multivitamin drugs, drugs that "tone" the central nervous system	Solution	"Queisser Pharma GmbH & Co. KG", Germany

		cyanocobalamin (vitamin B12) 3.5 μg, glycerol-1(2)-dihydrogen phosphate disodium salt 271 mg, choline citrate 222 mg, ammonium iron (III) citrate (iron content 16.5-18.5%) 200 mg, invert sugar 7,36 г, honey 1,2 г, hawthorn tincture (1:5) 0.6 ml, **St. John's wort tincture (1:5) 0.2 ml,** tinctures of yarrow (1:5) 0.2 ml, tinctures of mistletoe (1:5) 0.12 ml, tinctures of piper root (1:5) 0.175 ml, tinctures of valerian 0.16 ml, tinctures of hop cones 0.16 ml, orange tincture 0.1625 ml, sea salt 0.5 mg, sage oil 0.02 μl, rosemary oil 0.02 μl, lemon balm oil 0.04 μl, aromatic tincture 0.1625 ml			
34	DOPPEL-HERTZ® NERVE TONIC	100 ml of the drug contain: **liquid extract of St. John's wort 2.084 g**	Anti - depressants	Solution	"Queisser Pharma GmbH & Co. KG", Germany
35	NEURO-PLANT	ascorbic acid; microcrystalline cellulose; croscarmellose sodium; hypromellose; lactose, monohydrate; macrogol; magnesium stearate; sodium saccharin; silicon dioxide precipitated; antifoam emulsion (contains sorbic acid); pregelatinized corn starch; talc; vanillin; titanium dioxide (E 171); iron hydroxide (E 172)	Anti-depressants	Coated tablets	"Dr. Willmar Schwabe GmbH & Co.KG", Germany

36	NEW-PASIT	100 ml of solution contain: guaifenesin - 4.0 г, a complex of liquid extracts of medicinal plants (valerian, lemon balm, St. John's **wort,** common hawthorn, passionflower, common hops, black elderberry) - 7.75 g	Sedatives	Solution	"IVAX Pharmaceuticals" sro, Czech Republic
37	NEW-PASIT	1 tablet contains: Novo-Pasit dry extract (hops, St. John's **wort,** lemon balm, passionflower, elderberry, valerian, prickly hawthorn) - 0.1575 г, guaifenesin - 0.2 g	Sedatives	Coated tablets	"IVAX Pharmaceuticals" sro, Czech Republic
38	SEDAFLOX	100 гtea contains: black elder flowers - 15.0 г, St. John's wort grass - 10.0 г, valerian rhizomes with roots - 20.0 г, **peppermint leaves - 15.0** г, motherwort grass - 20.0 г, hawthorn fruits - 20.0 g	Sedatives	Medicinal tea	Scientific and Production Pharmaceutical Enterprise "Forces of Nature" LLC, Kharkiv, Ukraine
39	SEDAVIT®	1 tablet contains: Sedavita thick extract in terms of dry matter - 0,17 г(170 mg) (Sedavita thick extract is obtained from rhizomes with valerian roots, hawthorn fruits, **St. John's wort, peppermint leaves,** hop cones), pyridoxine hydrochloride (vitamin B6) in terms of 100% substance - 0,003 г(3 mg); nicotinamide (vitamin PP) in terms of 100% substance -0,015 g	Sedatives	Tablets	OJSC "Kyivmedpreparat", Kyiv; JSC "Halychpharm", Lviv, Ukraine

40	SEDAVIT®	100 ml of the drug contain: Sedavit, a liquid extract (1: 4.5) from a mixture of LRS: rhizomes with valerian roots, hawthorn fruits, **St. John's wort, peppermint leaves,** hop cones - 94 ml, pyridoxine hydrochloride (vitamin B6) - 0,06 г, nicotinamide (vitamin PP) - 0.3 g	Sedatives	Solution	JSC "Halychpharm", Lviv, Ukraine

Appendix B

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ
ІНСТИТУТ ПІДВИЩЕННЯ КВАЛІФІКАЦІЇ СПЕЦІАЛІСТІВ ФАРМАЦІЇ
КАФЕДРА ОРГАНІЗАЦІЇ, ЕКОНОМІКИ ТА УПРАВЛІННЯ ФАРМАЦІЄЮ

III Науково-практична інтернет-конференція з міжнародною участю

ПІДГОТОВКА СПЕЦІАЛІСТІВ ФАРМАЦІЇ В РАМКАХ КОНЦЕПЦІЇ «НАВЧАННЯ ПРОТЯГОМ ЖИТТЯ (LIFE LONG LEARNING)»: НАУКА, ОСВІТА, ПРАКТИКА

СЕРТИФІКАТ № 021

Даний сертифікат засвідчує, що

Asly Omar

брав(ла) участь у круглому столі «Сучасні аспекти управління фармацевтичними організаціями» за програмою обсягом 6 годин / 0,2 кредити ЄКТС

Досягнуті результати навчання: демонструвати інноваційність та лідерство у професійній діяльності, результатом яких є підвищення мотивації та здатності до навчання та професійного розвитку; здійснювати адаптацію та модифікацію існуючих наукових підходів до конкретних ситуацій професійної діяльності.

В. о. ректора НФаУ,
доктор фармацевтичних наук, професор Алла КОТВІЦЬКА

м. Харків, 23-24 жовтня 2024 р.

Appendix C


ПІДГОТОВКА СПЕЦІАЛІСТІВ ФАРМАЦІЇ
В РАМКАХ КОНЦЕПЦІЇ
«НАВЧАННЯ ПРОТЯГОМ ЖИТТЯ
(LIFE LONG LEARNING)»:
НАУКА, ОСВІТА, ПРАКТИКА
МАТЕРІАЛИ III НАУКОВО-ПРАКТИЧНОЇ
ІНТЕРНЕТ-КОНФЕРЕНЦІЇ З МІЖНАРОДНОЮ УЧАСТЮ,
ЯКА ПРИСВЯЧЕНА 40-РІЧЧЮ ЗАСНУВАННЯ
КАФЕДРИ ОРГАНІЗАЦІЇ, ЕКОНОМІКИ ТА УПРАВЛІННЯ
ФАРМАЦІЄЮ
(23-24 жовтня 2024 року, м. Харків)

УДК 615.1:378:001

П32

Реєстраційне посвідчення УкрІНЕТІ № 610 від 11 грудня 2023 р.

П32 **Підготовка** спеціалістів фармації в рамках концепції «Навчання протягом життя (Life Long Learning)»: наука, освіта, практика : матеріали III наук.-практ. інтернет-конференція з міжнар. участю, присвячену 40-річчю заснування кафедри організації, економіки та управління фармацією (23-24 жовт. 2024 р., м. Харків) / ред. кол. : Ю. С. Братішко та ін. - Х. : НФаУ, 2024. - 492 с. - (Серія «Наука»).

Збірка містить матеріали інтернет-конференції, в яких розглянуті науково-теоретичні і практичні питання: післядипломна підготовка спеціалістів фармації, її закордонний досвід та навчально-методичне забезпечення за умов дистанційного навчання; упровадження інноваційних технологій у фармацевтичну освіту; застосування концепції «Навчання протягом життя (Life Long Learning) » у системі навчання спеціалістів фармації; сучасні тенденції освіти з урахуванням соціальних і психологічних аспектів фармацевтичної діяльності; актуальні проблеми фармацевтичної технології, біотехнології, гомеопатії та клінічної фармації; сучасні напрямки маркетингу у складі економіки, науки, освіти, практики.

Видання призначене для широкого кола наукових, науково-педагогічних і практичних працівників.

Матеріали відповідають змісту та мові наданих оригіналів.

За достовірність матеріалів відповідальність несуть автори.

УДК 615.1:378:001

RELEVANCE OF DEVELOPMENT EXTEMPORANEOUS VITAMIN HERBAL MIXTURE FOR HYPOVITAMINOSIS USE

Omar Asly, Volodymyr V. Kovalov, Larisa A. Bobrytska, Olga V. Demeshko
National University of Pharmacy, Kharkiv, Ukraine
volodyakw@gmail.com

Introduction. Meeting our vitamin needs is crucial for both our physical and mental health. A diet rich in essential vitamins can boost our immune system. Besides following basic preventive measures to reduce the risk of infection and spreading diseases like SARS-CoV-2, it's essential to focus on complete nutrition.

A healthy and balanced diet can provide many vitamins. But the most important ones are A, B6, B12, C, D, E and K. A deficiency of these vitamins can lead to various diseases and exhaustion.

Vitamin A plays a crucial role in maintaining healthy vision, promoting immune function and reproduction, and preventing skin problems. It can also lead to brittle hair, nails, tooth and bone disease, as well as poor health and vision problems. Most vitamin A is found in animal liver, as well as fish oil, dairy products, and eggs. Plants contain provitamin A - carotene. Most of all carotene is found in carrots, pumpkin, chard, zucchini, carrots, melon, sweet peppers, and red peppers.

Vitamin D deficiency can cause fatigue, muscle pain, joint pain, weight gain, and digestive issues. It additionally prevents calcium absorption leading to brittle bones and dental problems. To regain lost vitamin D during the colder months, just 10-15 minutes of sunlight exposure daily is sufficient. Oily sea fish are the primary dietary source of vitamin D, with cod liver containing the highest amounts. Mackerel is listed first, followed by other fish such as salmon, herring, sardines, and fish caviar.

Vitamin E is a highly potent natural antioxidant. Objective assessment shows that sunflower oil has the highest vitamin E content. Smaller quantities of this vitamin can be found in almost all unrefined vegetable oils, seeds, and nuts.

Vitamin C is an important vitamin for the immune system. It is also involved in a number of essential processes. Vitamin C is not rare and is found in varying amounts

in almost all vegetables and fruits, as well as in greens. Summer berries and fruits are definitely worthy of attention: strawberries, currants, blueberries, gooseberries.

Of course, this is not the entire list of vitamins necessary for proper nutrition and human health. A balanced diet should also contain the necessary minerals, amino acids and other nutrients.

Aim. Substantiation of the extemporaneous vitamin herbal mixture for hypovitaminosis use development.

Materials and methods. To achieve the goal, general scientific methods of research were used: analysis, synthesis, comparison, generalization, comparison, systematization for processing literary data.

Results and discussion. The assortment of the modern pharmaceutical market is quite full of various vitamin complexes from a large number of manufacturers, standardized, registered and other dietary supplements.

If a person is experiencing symptoms of vitamin deficiency that may indicate an inadequate level of vitamins in the body, he or she should seek immediate medical attention. The utilization of dietary supplements or vitamins without a doctor's professional justification may produce both positive and negative effects in disease treatment or preventative use. However, unmonitored and independent use of such products can have serious adverse effects on the organism.

A large number of experimental studies confirm that synthetic vitamins have a much lower bioavailability in the human body than natural ones. Today, there are many options for preserving plant biologically active substances, such as freezing, freeze-drying, canning, etc. One solution to address vitamin deficiency caused by the inability to consume specific foods is to utilize plant extracts that are high in a specific vitamin. For instance, the Ukrainian pharmaceutical market provides options to address vitamin deficiencies by utilizing plant mixtures and extracts, innovative-gallic preparations, tinctures, and other means.

One of the simplest forms of using medicinal plants is herbal preparations, i.e., the preparation of aqueous extracts, among the advantages of which are ease of manufacture, complex action, and high bioavailability of active pharmaceutical

ingredients.

We propose a vitamin herbal mixture for hypovitaminosis to be used as a tonic and vitamin preparation. The composition of the tonic and vitamin preparation includes the following medicinal plant materials: rose hips, black currant leaves, peppermint leaves and dried blueberries.

According to the literature, such medicinal plant materials as rose hips, blueberries, and mint leaves are concentrators of vital elements necessary for human life. These plants are selectively able to absorb manganese, copper, chromium, vanadium, etc.

The main active ingredients of blackcurrant leaves and rose hips are manganese and ascorbic acid, which is used in pharmacy for manganese deficiency and vitamin deficiency. The active substances of blueberries are tannins and anthocyanins, which are used in case of copper, manganese and chromium deficiency. Mint leaves contain terpenoids and flavonoids and are used as an antispasmodic and choleretic agent.

In this case, the collection is a mixture of several types of dried crushed medicinal raw materials. The degree of grinding of each raw material must comply with the requirements of the regulatory documentation for a particular medicinal product. Given the fact that medicinal herbal preparations are a semi-finished product, i.e. an intermediate dosage form, the final product of which is aqueous extracts prepared at home.

Conclusions. Considering the above, we consider it rational and relevant to develop vitamin herbal mixture for hypovitaminosis use containing rosehip fruits, black currant leaves, peppermint leaves and blueberry fruits as APIs can be recommended for further research in order to expand the range of modern medicinal products intended for hypovitaminosis use.

Ф А 2.2.1–32-366

National University of Pharmacy

Faculty for foreign citizens' education
Department pharmaceutical drug technology

Level of higher education master

Specialty 226 Pharmacy, industrial pharmacy
Educational program Pharmacy

APPROVED
The Head of Department
Liliia VYSHNEVSKA

_____
"_06_" May 2024

ASSIGNMENT
FOR QUALIFICATION WORK
OF AN APPLICANT FOR HIGHER EDUCATION

Omar ASLY

1. Topic of qualification work: «Justification of the composition and technology of the extemporaneous vitamin herbal mixture for hypovitaminosis», supervisor of qualification work: Volodymyr KOVALOV, PhD, assoc. prof.,

approved by order of NUPh from "06" of February 2024 № 34

2. Deadline for submission of qualification work by the applicant for higher education: November 2024.

3. Outgoing data for qualification work: justification of the composition and technology of the extemporaneous vitamin herbal mixture for hypovitaminosis use as a tonic and vitamin preparation.

4. Contents of the settlement and explanatory note (list of questions that need to be developed): analyze and summarize literature data on hypovitaminosis; analyze the range of tonic and multivitamin medicines; conduct an analysis of the extemporaneous formulation of the fees; theoretically and experimentally choose the composition and technology of tonic and vitamin collection; to carry out microelement analysis of the plants included in the collection.

5. List of graphic material (with exact indication of the required drawings):
tables 7 , pictures 2

6. Consultants of chapters of qualification work

Chapters	Name, SURNAME, position of consultant	Signature, date	
		assignment was issued	assignment was received
1	Volodymyr KOVALOV, associate professor of higher education institution of department Pharmaceutical drug technology	20.05.2024	20.05.2024
2	Volodymyr KOVALOV, associate professor of higher education institution of department Pharmaceutical drug technology	14.06.2024	14.06.2024
3	Volodymyr KOVALOV, associate professor of higher education institution of department Pharmaceutical drug technology	16.09.2024	16.09.2024

7. Date of issue of the assignment: "06" May 2024

CALENDAR PLAN

№ з/п	Name of stages of qualification work	Deadline for the stages of qualification work	Notes
1	The topic selection	May 2024	done
2	Analysis of literary sources	June 2024	done
3	Conducting experimental research in	September - October 2024	done
4	Designing the work	October 2024	done
5	Submission of finished work to the examination commission	October 2024	done

An applicant of higher education _____ Omar ASLY

Supervisor of qualification work _____ Volodymyr KOVALOV

ВИТЯГ З НАКАЗУ № 34
По Національному фармацевтичному університету
від 06 лютого 2024 року

1. Затвердити теми кваліфікаційних робіт здобувачам вищої освіти 5-го курсу 2 циклу Фм20*(4,10д) 2024-2025 навчального року, ступінь вищої освіти «магістр», галузь знань 22 Охорона здоров'я, спеціальність 226 – Фармація, промислова фармація, освітньо-професійна програма – Фармація, денна форма здобуття освіти (термін навчання 4 роки 10 місяців). Мова навчання англійська.

№ з/п	Прізвище, ім'я здобувача вищої освіти	Тема кваліфікаційної роботи		Посада, прізвище та ініціали керівника	Рецензент кваліфікаційної роботи
• **по кафедрі аптечної технології ліків**					
1.	Аслі Омар	Обґрунтування складу та технології екстемпорального вітамінного збору для застосування при гіповітамінозах	Justification of the composition and technology of the extemporaneous vitamin herbal mixture for hypovitaminosis	доцент ЗВО Ковальов В.В.	доцент ЗВО Солдатов Д.П.

Ректор

Вірно. Секретар

ФА2.8-03-317

ВИСНОВОК

експертної комісії про проведену експертизу
щодо академічного плагіату у кваліфікаційній роботі

здобувача вищої освіти

«17» листопада 2024 р. № 329612138

Проаналізувавши кваліфікаційну роботу здобувача вищої освіти Аслі Омар, Фм20*(4,10д)-англ-01, спеціальності 226 Фармація, промислова фармація, освітньої програми «Фармація» навчання на тему: «Обгрунтування складу та технології екстемпорального вітамінного збору для застосування при гіповітамінозах / Justification of the composition and technology of the extemporaneous vitamin herbal mixture for hypovitaminosis», експертна комісія дійшла висновку, що робота, представлена до Екзаменаційної комісії для захисту, виконана самостійно і не містить елементів академічного плагіату (компіляції).

Голова комісії,
проректор ЗВО з НПР,
професор **Інна ВЛАДИМИРОВА**

Ф А 2.2.1-32-353

REVIEW

of scientific supervisor for the qualification work of the master's level of higher education of the specialty 226 Pharmacy, industrial pharmacy

Omar ASLY

on the topic: «Justification of the composition and technology of the extemporaneous vitamin herbal mixture for hypovitaminosis»

Relevance of the topic. Meeting our vitamin needs is vital for maintaining both physical and mental well-being. A diet rich in essential vitamins not only strengthens the immune system but also supports overall health. Prioritizing complete nutrition helps the body function optimally and enhances resilience against illnesses. One of the simplest forms of using medicinal plants is herbal preparations, ie, the preparation of aqueous extracts, among the advantages of which are ease of manufacture, complex action, and high bioavailability of active pharmaceutical ingredients. Master's thesis of Omar ASLY dedicated to justification of the composition and technology of the extemporaneous vitamin herbal mixture for hypovitaminosis use as a tonic and vitamin preparation.

Practical value of conclusions, recommendations and their validity. During the preparation of the thesis, Omar ASLY conducted an analysis of literary data related to correction of hypovitaminosis. Based on organoleptic, physico-chemical, and pharmacotechnological studies, the composition and technology of a tonic vitamin collection for addressing hypovitaminosis were scientifically substantiated. The results obtained can serve as a foundation for further development of the technology for producing this medicinal product. Additionally, the work carried out may be used to refine the composition of the collection, thereby contributing to the expansion of the range of vitamin-based preparations.

Assessment of work. The master's work was completed at a high modern level. The master's student successfully solved all tasks. The results of the work are of practical interest.

General conclusion and recommendations on admission to defend. Omar ASLY's Master's thesis can be submitted for defense to the Examination Commission of the National Pharmaceutical University for the assignment of the educational qualification level of Master of Pharmacy.

Scientific supervisor _____ Volodymyr KOVALOV

«4» of October 2024

Ф А 2.2.1-32-356

REVIEW

for qualification work of the master's level of higher education, specialty 226 Pharmacy, industrial pharmacy

Omar ASLY

on the topic: «Justification of the composition and technology of the extemporaneous vitamin herbal mixture for hypovitaminosis»

Relevance of the topic. Hypovitaminosis is a pathological condition that develops as a result of a decrease in the content of a certain vitamin (or vitamins) in the body. Vitamin deficiency is accompanied by disorders of biochemical and physiological processes and the occurrence of specific pathology. Despite the wide range of vitamin drugs used in hypovitaminosis, the number of herbal remedies is limited. Therefore, the problem of expanding the range of solid dosage forms for use in hypovitaminosis is relevant today. Qualification work Omar ASLY is devoted to this topical issue.

Theoretical level of work. The work carried out by Omar ASLY is devoted to analysis literature data on the market of drugs used in hypovitaminosis, theoretically substantiated the composition and technology of the tonic and vitamin collection.

Author's suggestions on the research topic. The master's student conducted theoretical and experimental studies on the justification of the choice of active and auxiliary substances of cream, studied its stability during storage, proposed a rational technology of cream.

Practical value of conclusions, recommendations and their validity. Based on the analysis of literature data and experiments conducted, the author proposed a rational composition and technology of the tonic and multivitamin collection for hypovitaminosis use. The obtained results can be used for the purpose of expanding the assortment of preparations for hypovitaminosis correction.

Disadvantages of work. According to the text of the work there are some typographical errors, bad expressions. However, this does not reduce the value of the work and does not call into question the results obtained.

General conclusion and assessment of the work. The qualification work of Omar ASLY deserves high marks, meets the requirements and can be submitted for official defense to the examination commission of the National University of Pharmacy.

Reviewer _____ assoc. prof. Dmytro SOLDATOV

«10» of October 2024

Ф А2.2.1-91-287

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

ВИТЯГ З ПРОТОКОЛУ № _2_

«_14_» _ жовтня _ 2024_ року
м. Харків

засідання кафедри
аптечної технології ліків
(назва кафедри)

Голова: завідувачка кафедри, професор Вишневська Л. І.

Секретар: докт. філ., ас. Зуйкіна Є.В.

ПРИСУТНІ:

проф. Половко Н.П., проф. Семченко К.В., проф. Зуйкіна С.С., проф. Левачкова Ю.В., доц. Ковальова Т.М., доц. Буряк М.В., доц. Ковальов В.В., доц. Олійник С.В., доц. Марченко М.В., доц. Живора Н.В., ас. Іванюк О.І., асп.Бондар Л.А., асп. Паливода П.В.

ПОРЯДОК ДЕННИЙ:

1. Про представлення до захисту кваліфікаційних робіт здобувачів вищоїосвіти.

СЛУХАЛИ: проф. Вишневську Л. І. – про представлення до захисту до Екзаменаційної комісії кваліфікаційних робіт здобувачів вищої освіти.

ВИСТУПИЛИ: Здобувач вищої освіти групи Phm19(4,10d) eng 04 спеціальності 226 «Фармація, промислова фармація» Omar ASLY – з доповіддю на тему «Justification of the composition and technology of the extemporaneous vitamin herbal mixture for hypovitaminosis» (науковий керівник, доц. Володимир КОВАЛЬОВ).

УХВАЛИЛИ: Рекомендувати до захисту кваліфікаційну роботу.

Голова
Завідувачка кафедри, проф. _____ **Лілія ВИШНЕВСЬКА**
(підпис)

Секретар
асистент _____ **Єлизавета ЗУЙКІНА**
(підпис)

Ф А2.2.1-32-042

НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

ПОДАННЯ
ГОЛОВІ ЕКЗАМЕНАЦІЙНОЇ КОМІСІЇ
ЩОДО ЗАХИСТУ КВАЛІФІКАЦІЙНОЇ РОБОТИ

Направляється здобувач вищої освіти Omar ASLY до захисту кваліфікаційної роботи
за галуззю знань 22 Охорона здоров'я
спеціальністю 226 Фармація, промислова фармація
освітньою програмою Фармація
на тему: «Justification of the composition and technology of the extemporaneous vitamin herbal mixture for hypovitaminosis»

Кваліфікаційна робота і рецензія додаються.

Декан факультету _____/ Світлана КАЛАЙЧЕВА /

Висновок керівника кваліфікаційної роботи

Здобувач вищої освіти Omar ASLY представила кваліфікаційну роботу, яка за об'ємом теоретичних та практичних досліджень повністю відповідає вимогам до оформлення кваліфікаційних робіт.

Керівник кваліфікаційної роботи

_____ Володимир КОВАЛЬОВ

«04» жовтня 2024 р.

Висновок кафедри про кваліфікаційну роботу

Кваліфікаційну роботу розглянуто. Здобувач вищої освіти Omar ASLY допускається до захисту даної кваліфікаційної роботи в Екзаменаційній комісії.

Завідувачка кафедри
аптечної технології ліків

_____ Лілія Вишневська

«14» жовтня 2024 р.

Qualification work was defended

of Examination commission on

« 28 » of November 2024

With the grade _____

Head of the State Examination commission,

D.Pharm.Sc, Professor

_____ / Oleh SHPYCHAK