

ODESSA NATIONAL MEDICAL UNIVERSITY
Department of General and Clinical Pharmacology and Pharmacognosy

METHODOLOGICAL DEVELOPMENT

Course: "Pharmacognosy"

practical lesson for students on the topic:

"Proteins and proteins. Macro- and microelements. Organic acids. Glucosinolates (thioglycosides) and cyanogenic glycosides. Beekeeping products: pollen, apilak, propolis. LR and raw materials containing organic acids, silicic acid. Pomegranate, hibiscus, four-petalled cranberry. LR and raw materials containing glycosides and non-glycosidic sulfur compounds. Types of mustard, bitter almonds. "

Course: 3rd Faculty: medico-pharmaceutical

**Approved on methodical
meeting of the department
"30" August 2024
Protocol № 1
Head department
MD, prof. JV Rozhkovsky**



1. The topic of the lesson: Proteins and proteins. Macro- and microelements. Organic acids. Glucosinolates (thioglycosides) and cyanogenic glycosides. Beekeeping products: pollen, apilak, propolis. LR and raw materials containing organic acids, silicic acid. Pomegranate, hibiscus, four-petalled cranberry. LR and raw materials containing glycosides and non-glycosidic sulfur compounds. Types of mustard, bitter almonds. " - 2 years

2. Relevance of the topic.

The biologically active substances to which the lecture is devoted belong to the compounds of primary synthesis, which ensure the existence of plant organisms, perform important functions and are very widespread. Proteins, macro- and microelements, organic acids are more often considered as concomitant BAS, although some of them are able to provide certain pharmacological effects, which is why they are used directly in medicine and pharmacy. Knowledge of the action of such BAS, as well as their role in ensuring the functioning of the human body is very important in the practical training of pharmacists. Due to the high prevalence of these groups of BAS, which are part of many plant and animal foods, the assimilation of the topic is largely based on previous practical experience of students, which provides additional positive motivation to study it.

3. Objectives of the lesson:

3.1. General goals: to study LR containing peptides and to perform work on macro- and microscopic analysis of raw materials: pomegranate, hibiscus, four-petalled cranberry.

3.2. Educational goals: formation of a professionally significant substructure of personality with relevant aspects of deontological, ecological, legal, psychological, patriotic, professional responsibility.

3.3. Specific goals:

- **Know** (level of assimilation according to Bezpalk - II):

1. Definition of "Proteins and proteins. Macro- and microelements. Organic acids. Glucosinolates (thioglycosides) and cyanogenic glycosides ", their classification.
2. Physico-chemical properties of fatty oils.
3. Morphological characteristics of plants, their habitats (cultivation areas), places of growth.
4. Chemical composition, uses and medical use of medicinal plant raw materials containing fatty oils.

Based on theoretical knowledge and laboratory work:

- Master the techniques (be able) (level of assimilation according to Bezpalk - III):

1. Recognize the appearance of proteins and proteins, macro- and microelements, organic acids, glucosinolates (thioglycosides) and cyanogenic glycosides and distinguish them from possible impurities;
2. Determine the identity and quality of raw materials by external signs, anatomical structure and histochemical reactions.

4. Interdisciplinary integration

№ p.p.	discipline	know	be able
1	2	3	4
1.	Previous disciplines: 1. Botany 2. Organic chemistry 3. Analytical chemistry	Characteristic features of the families of the studied plants. Morphology of stem, bark, leaves, flower, fruit, root and rhizome. Anatomical structure of the leaf, bark, fruit, root, rhizome. Physical and chemical properties of polysaccharides, glycosides, terpenoids, aromatic derivatives, heterocycles. Methods of acid-base titration (neutralization) and permanganatometry	Use a microscope, prepare surface preparations and cross-sections. Carry out qualitative reactions; purification of organic compounds. Work with analytical scales, measuring vessels, photoelectro-

			colorimeter, use methods of chromatography on paper and in a thin layer of sorbent.
2.	<p>The following disciplines:</p> <p>1. Physical and colloid chemistry</p> <p>2. Pharmacy technology of drugs</p> <p>3. Industrial technology of medicines</p> <p>4. Clinical pharmacology</p>	<p>Solubility of solids and liquids in liquids. Distillation. Raoul's law. Konovalov's law. Vapor pressure and composition over mutually insoluble liquids. Buffer solutions. Polarography. Potentiometric titration. Adsorption. Ion exchange adsorption. Chromatography: paper, column, in a thin layer of sorbent, gel chromatography.</p> <p>Methods of measuring mass and volume. Preparation of powders or liquid drugs for internal and external use. Analysis of prepared liquid drugs using a burette system.</p> <p>Conditions of industrial preparation of medicines. Principles of organization of pharmaceutical production of various dosage forms: liquid, solid, soft, injectable solutions, etc. Machines, devices, equipment for the production of medicines.</p> <p>Pharmacodynamics and pharmacokinetics of drugs. The pattern of action of drugs on the human body and its corresponding reactions. Basic principles of treatment in terms of drug selection, evaluation of their effectiveness and safety.</p> <p>Methods of qualitative and quantitative study of drugs.</p>	

	<p>5. Pharmaceutical chemistry</p> <p>6. Organization and economics of pharmacy</p> <p>7. Management and marketing in pharmacy</p>	<p>Pharmaceutical service management. Storage of medicines. Control and analytical service, organization of its work. Accounting for inventory and cash. Economic analysis of the pharmacy.</p> <p>Management and entrepreneurship. Organization as an object of management. Connecting processes in management. Human Resource Management Pharmaceutical Marketing Management. Pharmaceutical market research. International marketing.</p>	
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5. Content of the topic (text and thesis), graphic structure of the lesson.



6. Plan and organizational structure of the lesson.

№№ р.р.	The main stages of the lesson, their functions and content.	Learning objectives in the levels of mastery.	Means of training and control.	Materials on methodical forensuring the visibility	Term (in minutes or in%) of the total class
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				of the lesson, control the knowledge of those who teachis.	time.
1	2	3	4	5	6
1	<i>Preparatory stage</i> Organization of classes Setting learning goals Homework check	II	Oral interview on the topic	Methodical works for students, album	1% 2% 25%
2	<i>The main stage</i> Conducting a practical lesson 1. Definitions. 2. Classification of proteids 3. Physico-chemical properties of proteins and their functions 4. Protein proteins and their medical use 5. Plant enzymes 6. Definition and classification of organic acids 7. Plant sources of organic acids and their significance and uses 8. Mineral elements and their meanings. The concept of "biological" concentration. 9. Thioglycosides and cyanoglycosides (definition, structure, properties)	III	Herbariums of medicinal plants, LRS, reagents		50%
3	<i>The final stage</i> Testing and assessment of practical skills Checking the final level of knowledge	II- III II- III	Herbariums of medicinal plants, LRS, reagents	Methodical works for students, album Tests and situational tasks	5% 15%

	Providing homework with a reference to the literature				3%
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7. Materials on methodological support of the lesson

7.1. Control materials for the preparatory stage of the lesson: questions, tasks, tests.

Tests:

1. They do not belong to the substances of primary synthesis
 - A. Flavonoids
 - B. Proteins
 - C. Proteids
 - D. Lipids
 - E. Organic acids

2. Proteins are
 - A. Simple proteins consisting only of amino acid residues
 - B. B. Complex proteins
 - c. Proteins associated with substances of non-protein origin
 - D. Monomers of complex proteins
 - E. Vegetable proteins

3. Make the appropriate pairs of "enzyme function"
 - A. Immunoglobulin 1. Structural
 - B. Hemoglobin 2. Protective
 - W. Collagen 3. Transport. Right answer: A-2, B-3, B-1.

4. It belongs to aromatic organic acids
 - A. Head
 - B. Dairy
 - c. Vinegar
 - D. Lemon

E. Apple

5. In the free state, organic acids are found in plants

A. Cell juice

B. Wooden fabrics

C. Cell membranes

D. Special endogenous formations

E. Exogenous formations

6. Highlight the most common organic acids in the plant world:

A. Apple and lemon

B. Amber and pyruvic

C. Kumarov and chlorogenic

D. Oil and vinegar

E. Cinnamon and coffee

7. To determine the content of minerals in the LRS is analyzed

A. Ash

B. Alcohol extract

C. Broth

D. Dried raw materials

E. Fresh raw materials

8. Trace elements from plant materials are better absorbed by the human body because

A. Are in a plant in "biological" concentrations

B. Are in a free condition

C. Are in the form of soluble salts

D. Do not form toxic compounds

E. Are in high concentrations

9. Cyanoglycosides have sedative and analgesic effects, but their use is not common due to

- A. Toxicity of their hydrolysis products
- B. Lack of sufficient raw material base
- C. Lack of optimal dosage forms
- D. Low pharmacological activity of drugs
- E. Very complex technology of their extraction from LRS

10. Seeds are used to make mustard seeds

- A. Cultivated Sarepta and black mustard
- B. Cultivated white mustard
- C. Wild white mustard
- D. Cultivated field mustard
- E. Wild mustard field

Question:

1. Which BAS belong to the substances of primary biosynthesis?
2. Why should proteins be considered substances of primary biosynthesis?
3. Name the known amino acids that are part of proteins.
4. What mineral elements should be considered macro and why?
5. What acids do you know are organic?
6. What physical {smell, taste) properties should be expected from thioglycosides when they are broken down into aglycones?

7.2. Materials of methodical support of the main stage of employment: professional algorithms, orientation maps for formation of practical abilities and skills, educational tasks.

The list of educational practical tasks that must be performed during the practical laboratory lesson:

Task 1. To study raspberries and to carry out the analysis of raw materials on AND (section: external signs).

1.1. Examine the appearance of raspberries on a herbarium sample.

Write down the Latin and Russian names of the raw materials that produce plants and families, sketch.

DEFINITION OF PLANTS BY EXTERNAL SIGNS

	Botanical description of the plant (indicate the characteristic features)
	Growth area, ecology

1.2. Write down the conditions of procurement, drying and storage of raw materials

1.3. Write down possible impurities in the raw material

1.4. Describe the appearance of raspberries on the example of a sample of raw materials.

ANALYSIS OF RAW MATERIALS "FRUITS AND SEEDS" By external signs

- Commodity type of raw material

- Type of fruit (berry, box, perianth, drupe, achene, bean, etc.)

- The shape of the fruit (spherical, oblong, crescent-shaped, etc.)

- The nature of the surface (smooth, pitted, ribbed, wrinkled, shiny, matte, etc.)

- The shape and structure of the pericarp (pericarp)

- The number of seeds or seeds, their shape and structure, surface structure

- Color

- Dimensions (length, thickness)

- Smell (when rubbed)

- Taste (in non-toxic objects)

1.5. Note the compliance of the test sample of raw materials) with the requirements of the AND

1.6. The main active ingredients of raspberry LRS:

1.7. Raspberry preparations and their application:

Task 2. To study a four-petalled cranberry and to carry out the analysis of raw materials on AND (section: external signs).

1.1. Examine the appearance of cranberries on a herbarium sample.

Write down the Latin and Russian names of the raw materials that produce plants and families, sketch.

DEFINITION OF PLANTS BY EXTERNAL SIGNS

	Botanical description of the plant (indicate the
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	characteristic features
	Growth area, ecology

1.2. Write down the conditions of procurement, drying and storage of raw materials

1.3. Write down possible impurities in the raw material

1.4. Describe the appearance of cranberries on the example of a sample of raw materials.

ANALYSIS OF RAW MATERIALS "FRUITS AND SEEDS" by external signs

- Commodity type of raw material

- Type of fruit (berry, box, seedling, stone fruit, achene, bean, etc.)

- The shape of the fruit (spherical, oblong, crescent-shaped, etc.)

- The nature of the surface (smooth, pitted, ribbed, wrinkled, shiny, matte, etc.)

- The shape and structure of the pericarp (pericarp)

- The number of seeds or seeds, their shape and structure, surface structure

- Color

- Dimensions (length, thickness)

- Smell (when rubbed)

- Taste (in non-toxic objects)

1.5. Note the compliance of the test sample of raw materials) with the requirements of the AND

1.6. The main active ingredients of cranberry LRS:

1.7. Cranberry preparations and their application:

Task 3. To study mustard and to carry out the analysis of raw materials on AND (section: external signs).

1.1. Examine the appearance of black and Sarep mustard according to the herbarium pattern.

Write down the Latin and Russian names of the raw materials that produce plants and families, sketch.

DEFINITION OF PLANTS BY EXTERNAL SIGNS

	Botanical description of the plant (indicate the characteristic features)
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	Growth area, ecology

1.2. Write down the conditions of procurement, drying and storage of raw materials

1.3. Write down possible impurities in the raw material

1.4. Describe the appearance of mustard fruits on the example of a sample of raw materials.

ANALYSIS OF RAW MATERIALS "FRUITS AND SEEDS" by external signs

- Commodity type of raw material

- Type of fruit (berry, box, perianth, drupe, achene, bean, etc.)

- The shape of the fruit (spherical, oblong, crescent-shaped, etc.)

- The nature of the surface (smooth, pitted, ribbed, wrinkled, shiny, matte, etc.)

- The shape and structure of the pericarp (pericarp)

- The number of seeds or seeds, their shape and structure, surface structure

- Color

- Dimensions (length, thickness)

- Smell (when rubbed)

- Taste (in non-toxic objects)

1.5. Note the compliance of the test sample of raw materials) with the requirements of the AND

1.6. The main active ingredients of LRS mustard:

1.7. Mustard preparations and their application:

Task 4. To study bitter almonds and to carry out the analysis of raw materials on AND (section: external signs).

1.1. Examine the appearance of bitter almonds and steppe almonds as a possible herbarium admixture.

Write down the Latin and Russian names of the raw materials that produce plants and families, sketch.

DEFINITION OF PLANTS BY EXTERNAL SIGNS

	Botanical description of the plant (indicate the characteristic features)
	Growth area, ecology

1.2. Write down the conditions of procurement, drying and storage of raw materials

1.3. Write down possible impurities in the raw material

1.4. Describe the appearance of almonds on the example of a sample of raw materials.

ANALYSIS OF RAW MATERIALS "FRUITS AND SEEDS" by external signs

- Commodity type of raw material

- Type of fruit (berry, box, perianth, drupe, achene, bean, etc.)

- The shape of the fruit (spherical, oblong, crescent-shaped, etc.)

- The nature of the surface (smooth, pitted, ribbed, wrinkled, shiny, matte, etc.)

- The shape and structure of the pericarp (pericarp)

- The number of seeds or seeds, their shape and structure, surface structure

- Color

- Dimensions (length, thickness)

- Smell (when rubbed)

- Taste (in non-toxic objects)

1.5. Note the compliance of the test sample of raw materials) with the requirements of the AND

1.6. The main active ingredients of LRS almonds:

1.7. Almond preparations and their application:

7.3. Control materials for the final stage of the lesson: tasks, tasks, tests, etc.

Tests:

1. Trace elements from plant raw materials are better absorbed by the human body

because

- A. Are in a plant in "biological" concentrations
- B. Are in a free condition
- C. Are in the form of soluble salts
- D. Do not form toxic compounds
- E. Are in high concentrations

2. Cyanoglycosides have sedative and analgesic effects, but their use is not common due to

- A. Toxicity of their hydrolysis products
- B. Lack of sufficient raw material base
- C. Lack of optimal dosage forms
- D. Low pharmacological activity of drugs
- E. Very complex technology of their extraction from LRS

3. Seeds are used to make mustard seeds

- A. Cultivated Sarepta and black mustard
- B. Cultivated white mustard
- C. Wild white mustard
- D. Cultivated field mustard
- E. Wild mustard field

8. Literature

Basic literature

1. **Фармакогнозія: підручник (I—III р. а.) / І.А. Бобкова, Л.В. Варлахова. – 3-є видання Всеукраїнське спеціалізоване видавництво «Медицина» 2018, 504с.**
2. Фармакогнозія: базовий підручн. для студ. вищ. фармац. навч. закл.(фармац. ф-тів) IV рівня акредитації / В.С. Кисличенко, І.О. Журавель, С.М. Марчишин та ін.; за ред. В.С. Кисличенко. – Харків: НФаУ: Золоті сторінки, 2015. - 736 с.

3. Навчальний посібник з дисципліни «Фармакогнозія» / Я. В. Рожковський, Б. В. Приступа, І. А. Бойко, Н. В. Герасимюк, В. В. Черногорюк -: Методична розробка кафедри фармакогнозії ОНМедУ. – Одеса: ОНМедУ, 2019 – 51 с.

4. Державна Фармакопея України: в 3 т. / Державне підприємство «Український науковий фармакопейний центр якості лікарських засобів». – 2-е вид. – Харків: Державне підприємство «Український науковий фармакопейний центр якості лікарських засобів», 2015. – Т. 1. – 1500 с.

Additional literature:

1 Державна Фармакопея України: в 3 т. / Державне підприємство «Український науковий фармакопейний центр якості лікарських засобів». – 2-е вид. – Харків: Державне підприємство «Український науковий фармакопейний центр якості лікарських засобів», 2014. – Т. 3. – 732 с.

2. Практикум з ідентифікації лікарської рослинної сировини: навч. посіб. / [В. М. Ковальов, С. М. Марчишин, О. П. Хворост та ін.] ; за ред. В. М. Ковальова, С. М. Марчишин. – Тернопіль: ТДМУ, 2014. – 250 с.

10. The topic of the next lesson:

Vitamins. General characteristics. LR and raw materials containing vitamins: species of dog rose, black currant, mountain ash, buckthorn, calendula, nettles, nettles, corn, buckthorn.

Methodical recommendations were made by  *associate professor Boyko IA*

(Signature)