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QUALIFICATION WORK

on the topic: **«CLINICAL AND PHARMACOLOGICAL ASPECTS OF THE RATIONAL USE OF OTC DRUGS FOR THE TREATMENT OF COUGH»**

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ANNOTATION

The qualification work is devoted to the study of clinical and pharmacological aspects of the rational use of OTC drugs for the treatment of cough and the assessment of the awareness of higher education students and pharmacy professionals in this area.

The work is presented on 46 pages of printed text and consists of an introduction, three chapters, conclusions, references and appendices. The work is illustrated with 2 tables and 28 figures.

Keywords: OTC medicines, symptomatic treatment, cough, survey.

АНОТАЦІЯ

Кваліфікаційна робота присвячена вивченню клінічних та фармакологічних аспектів раціонального використання безрецептурних препаратів для лікування кашлю та оцінці обізнаності студентів вищих навчальних закладів та фармацевтичних фахівців у цій сфері.

Робота представлена на 46 сторінках друкованого тексту та складається зі вступу, трьох розділів, висновків, списку використаних джерел та додатків. Робота ілюстрована 2 таблицями та 28 рисунками.

Ключові слова: безрецептурні препарати, симптоматичне лікування, кашель, опитування.

CONTENT

LIST OF ABBREVIATIONS

ACE – angiotensin converting enzyme;

COPD – chronic obstructive pulmonary disease;

CNS – central nervous system;

CF – cystic fibrosis;

DNA – deoxyribonucleic acid;

FMPR – Faculty of Medicine and Pharmacy of Rabat;

GER – gastroesophageal reflux;

GERD – gastroesophageal reflux disease;

NAC – N-acetylcysteine;

NUPh – National University of Pharmacy;

OTC – over-the-counter;

SCMC – S-carboxymethylcysteine (carbocysteine);

TB – tuberculosis;

UACS – upper airway cough syndrome;

URI – upper respiratory infection.

INTRODUCTION

Relevance of the topic. Cough consists of three phases (inhalation, contraction, and exhalation) and serves as a vital defense mechanism for lung health. It prevents pulmonary aspiration, promotes ciliary activity, and clears airway obstruction. The importance of an intact cough mechanism is reflected in the occurrence of lung problems when coughing is ineffective [6].

Cough remains a serious clinical problem, both as a symptom of a range of other conditions such as asthma, chronic obstructive pulmonary disease, gastroesophageal reflux (GER), and as a problem in its own right in patients with chronic cough of unknown origin [2, 19].

Cough is associated with significantly impaired health-related quality of life, regardless of whether it is acute or chronic. Sleep disturbance, nausea, chest pains, and lethargy occur frequently, and patients with chronic cough often experience social embarrassment, urinary incontinence, and low mood. There is a significant economic cost for the individual with cough and society when it leads to absence from work and lost productivity [3].

Therefore, understanding the clinical and pharmacological aspects of the rational use of over-the-counter (OTC) cough medications is absolutely essential for the modern pharmaceutical professional.

Aim of the study. To research the awareness of higher education students and pharmacy professionals regarding clinical and pharmacological aspects of the rational use of OTC drugs for the symptomatic treatment of cough.

Tasks of the study:

1. A review of the scientific literature on the causes and pathogenetic basis of cough, approaches to the symptomatic treatment of its main forms, as well as the main groups of drugs used to treat this symptom.

2. Development of questionnaires for surveying pharmaceutical professionals and senior students regarding their awareness regarding clinical and

pharmacological aspects of the rational use of OTC drugs for the symptomatic treatment of cough.

3. Conducting anonymous survey among the specified audiences and analysis of the respondents' answers.

Object of the study. Results of the survey of pharmaceutical professionals and students on the issues of clinical and pharmacological aspects of the rational use of OTC drugs for the symptomatic treatment of cough.

Subject of the study. Theoretical and practical aspects of the rational use of drugs for the symptomatic treatment of cough.

Methods of the study. To achieve the research goal, the following methods were used in the work: bibliosemantic analysis of scientific literature, sociological survey (questionnaire), statistical processing of results, system analysis.

Practical significance of the obtained results. The results of the study can be used in the educational process in the training of future pharmaceutical specialists and in the improvement of the qualifications of pharmaceutical professionals.

Approbation of the results of study and publications. The results of the study were presented at the XXXI International Scientifical and Practical Conference of Young Scientists and Students TOPICAL ISSUES OF NEW MEDICINES DEVELOPMENT, which took place at the National University of Pharmacy (NUPh), Kharkiv, on April 23-25, 2025. Based on the results of the research, theses «Clinical and pharmacological aspects of the rational use of OTC drugs for the treatment of cough» were published in the collection of materials of the aforementioned conference (Appendix B).

Structure and scope of the qualification work. The work is presented on 46 pages of printed text and consists of an introduction, three chapters, conclusions, references (30 names) and 2 appendices. The work is illustrated with 2 tables and 28 figures.

CHAPTER 1. THEORETICAL ASPECTS OF THE RATIONAL USE OF DRUGS FOR THE SYMPTOMATIC TREATMENT OF COUGH

1.1. Physiology and pathophysiology of cough

Cough is comprised of three phases (inspiratory, compressive and expiratory) and serves as a vital defensive mechanism for lung health. It prevents pulmonary aspiration, promotes ciliary activity and clears airway debris. The importance of an intact cough mechanism is reflected in the occurrence of pulmonary problems when cough is inefficient. Cough efficiency is dependent on physical/mechanical aspects (respiratory muscles, mucus, airway calibre and larynx) and integrity of the neurophysiological pathway of cough [6].

Cough, the most common symptom seen by general practitioners, has important defensive roles in health and disease. Ineffective cough is associated with respiratory morbidity such as recurrent pneumonia. However, chronic cough can be troublesome. It impairs the quality of life of adults and significantly worries the parents of coughing children. Coughs are easily recognisable, and parents are almost as good as clinicians at recognising cough quality (wet/dry) in their children [6, 17, 19, 28].

Physiologically, cough has three phases: inspiratory, compressive and expiratory. The inspiratory phase consists of inhaling a variable amount of air that serves to lengthen the expiratory muscles, optimising the length-tension relationship. The compressive phase consists of a very brief (200 ms) closure of the glottis to maintain lung volume as intrathoracic pressure builds (up to 300 mmHg in adults) due to isometric contraction of the expiratory muscles against a closed glottis. The expiratory phase starts with opening of the glottis, releasing a brief (30–50 ms) supramaximal expiratory flow (up to 12 l/s in adults, also termed the ‘cough spike’) followed by lower (3–4 l/s) expiratory flows lasting for a further 200-500 ms. Dynamic compression of the airways occurs during the expiratory phase and the high velocity expulsion of gas (air) sweeps airway debris along. Airway debris and

secretions are also swept proximally by ciliary activity. Cough enhances mucociliary clearance in healthy individuals as well as those with lung disease [6, 28].

The sound of a cough is due to vibration of the large airways and laryngeal structures during turbulent flow in expiration, and is said to be individualised akin to individualised voice.

Physiologists describe two types of cough: laryngeal (a true reflex, also known as 'expiratory reflex') and tracheobronchial. In laryngeal cough, inspiration may be minimal and is initiated in clinical situations when laryngeal receptors are stimulated by aspiration of foreign material. Tracheobronchial cough, on the other hand, is initiated distal to the larynx and can be volitional [6, 7].

Receptors involved in cough are terminations of vagal afferents in airway mucosa and submucosa. These afferent receptors have different sensitivity to different stimuli and are unequally distributed in the airways. The larynx and proximal large airways are generally more mechanosensitive and less chemosensitive than the peripheral large airways. Laryngeal receptors are exquisitely mechanosensitive and their stimulation leads to laryngeal cough (an expiratory cough reflex) [6, 28].

Clinical states reflecting pathophysiology of the cough pathway can be divided into: (a) increased (in response to a trigger, e.g. a respiratory infection) or 'excessive' (irritating cough with little physiological value) cough; and (b) decreased cough. In conditions related to increased cough, triggers often involve several components of the cough pathway, e.g. tobacco smoke can cause cough through its influence on cough epithelium but also through the central pathway [6, 17].

The pathophysiology of cough related to airway viral infections also involves several components of the cough pathway. In the acute phase, viruses change the function of the epithelial cells. This initiates a cascade of inflammatory and immune responses (eosinophils, interleukin-8, eotaxin etc.), some of which are tussogenic. Sensory nerve function change also occurs, increasing tachykinins in the lungs.

Knowledge of the physiology of cough is clinically relevant. For example, in conditions where cough is inefficient, recognition of the likelihood of poor

mucociliary clearance may prompt the use of other mucociliary clearance techniques [6, 17, 28].

1.2. Types of cough. Acute, subacute and chronic cough

Cough can be characterized by defining 3 aspects:

1. Duration of cough

Acute – less than 2 weeks.

Protracted – 2 to 4 weeks.

Chronic – greater than 4 weeks.

2. Potential underlying disease

Expected.

Specific.

Non specific.

3. Cough quality

Classically recognized.

Moist/productive or dry.

'Protracted bronchitis' [1].

Expected cough will be seen in association with other features such as wheeze, airway abnormalities, cardiac disease, clubbing, feeding difficulties, immune deficiency, specific drugs, upper respiratory infections (URI) or developmental abnormalities.

Specific coughs relate to those with recognized characteristics and the others are non-specific.

Classically recognized coughs include the brassy/barking cough of croup, tracheomalacia or habit cough, the honking psychogenic cough, the paroxysmal cough of pertussis and the staccato cough of Chlamydia in infants.

The cough may be moist or dry. Children frequently do not expectorate sputum so that we tend to refer to a wet/moist cough which implies a productive cough. A dry cough may become moist as small amounts of secretion can still sound dry so it should be reviewed regularly [1, 21].

For the majority of patients with acute cough, the causes can be either viral or bacterial, and tend to be as a result of upper respiratory tract infections, such as acute bronchitis or tracheobronchitis (Tab. 1.1). The vast majority of these infections are viral in nature and tend to be self-limiting. Only a few patients with an acute cough will actually seek medical attention. The cough itself lasts one to two weeks and disappears once the trigger is gone. Whilst it is impossible to predict whether or not an acute cough will become chronic, it is important to remember that repeated cases of acute cough can indicate an underlying chronic disease such as asthma [8, 27].

Table 1.1

Classification of common cough etiologies based on duration: acute, subacute, and chronic

I. Acute cough	II. Subacute cough	III. Chronic cough
Upper respiratory tract infection	Upper respiratory tract infection	Upper airway cough syndrome (UACS)
Allergic rhinitis	Pertussis	Asthma / Cough variant asthma / eosinophilic bronchitis
Acute bronchitis	COPD (chronic obstructive pulmonary disease)/Asthma exacerbation	GERD (gastroesophageal reflux disease)
Acute expose to environnemental pollutants	Bronchiectasis	COPD
COPD / Asthma exacerbation	Bronchiolitis	Iatrogenic (drugs)
Pneumonia	Eosinophilic bronchitis	Bronchiectasis
Aspiration	GERD	Lung cancer

In the absence of other upper respiratory symptoms of a viral infection particularly in younger children, the question of a possible aspiration episode should always be considered. Cough is reported in almost 70% of these. A paroxysmal cough is usually due to pertussis but is seen with viruses such as adenovirus and

para-influenza or mycoplasma. The sudden onset of a barking cough, especially at night, is characteristic of croup [1, 21].

Subacute coughs are usually the result of bronchial hyperresponsiveness following a specific infection. The cough tends to be bothersome even after the inciting infection has completely resolved. There is a lack of good quality evidence to explain a clear practical approach to treat these types of subacute coughs, but health practitioners tend to use inhaled corticosteroids and even advanced therapy like leukotriene modifiers as first line agents. Evidence suggests that these coughs are also self-limiting in cases of post-infection bronchial hyper-responsiveness. Some cases of subacute coughs can be caused by Bordetella pertussis infections. In this case, the cough tends to be persistent with disabling paroxysms, even though the infection itself has completely resolved [5, 8, 27].

Some of the non-infectious causes of subacute coughs include gastroesophageal reflux disease (GERD), bronchial asthma and upper airway cough syndrome. In addition, some pathologies may present initially with subacute cough symptoms, including lung cancers, pulmonary tuberculosis (TB), asbestosis, and other pulmonary conditions [5, 27].

With a chronic cough, the most common causes are: upper airway cough syndrome (previously known as the post nasal drip), GERD, asthma and pulmonary TB. Cough may also be a complication of drug therapy such as the use of angiotensin converting enzyme (ACE) inhibitors. Some of the less common causes of chronic cough include a varying number of disease that affect the airways like non-asthmatic eosinophilic bronchitis, chronic bronchitis, neoplasms and foreign bodies [8, 25, 27].

Upper Airway Cough Syndrome (UACS) is a common cause of both a subacute and chronic cough. The underlying reasons for the post nasal drip include seasonal or perennial allergic rhinitis, vasomotor rhinitis, acute nasophyrangitis and sinusitis. Symptoms of the post nasal drip include frequent nasal discharge, a sensation of fluid dripping down into the back of the throat and the frequent need of patients to clear their throats [25, 27].

In adults, asthma is the second leading cause of a persistent cough. The cough associated with asthma is usually nocturnal and is usually accompanied by an episodic wheeze, shortness of breath and even chest tightness. However, it can be the sole symptom in a form of asthma known as “cough variant asthma”. Cough variant asthma is a rare form of asthma and shows no evidence of airway obstruction on spirometry. In patients with traditional bronchial asthma, the characteristic symptoms can be expected along with variability in symptoms, precipitation of attacks by a range of factors like environmental allergens as well as the patients’ response to bronchodilators and corticosteroids [11, 27].

People with a cough lasting longer than 4 weeks should be evaluated for an underlying respiratory or systemic disease, have a chest radiograph and, if old enough, spirometry [7, 10, 20].

The age of onset can be helpful with those starting around birth more likely to be of congenital origin. A productive cough is more likely to be due to suppurative lung disease. Timing may be useful in that cough which goes away on sleeping is very likely to be psychogenic. A smoking history should be sought, particularly in adolescents [1, 7, 26].

In adults, the 3 most common causes of chronic cough are GER, asthma and postnasal drip. Experts recommend recommends investigation for all these and treat accordingly, thus achieving an effective result in most. The diagnosis in those seen by family practitioners may be different to those seen by specialists. Children are not found to have the same range of disorders as adults [14, 15].

1.3. Aspects of the rational use of mucolytics, expectorants and antitussives in the treatment of cough

An expectorant can be defined as an agent that induces discharge or expulsion of mucus from the respiratory tract. This typically requires a coughing or sneezing action to loosen and bring up the mucus from the lungs or upper respiratory tract. These events can be seen as beneficial if mucus plugs that obstruct large, medium or small airways are dislodged [4].

Clinically available expectorant medicines are aimed at inhibiting the production and secretion of mucins, reducing the viscoelasticity of mucus, rehabilitating the normal structure and function of the mucus layer, improving mucociliary clearance and accelerating the transport of mucus. Accordingly, they are known as mucoactive agents, and are further divided into: 1) nausea-stimulating expectorants, such as guaifenesin; 2) mucolytics, such as ambroxol, which cleave mucopolysaccharide fibers, and N-acetylcysteine (NAC) and carbocisteine, which cleave disulfide bonds; 3) mucokinetics; and 4) proteases and nucleases, such as α-chymotrypsin [29].

Classic mucolytics depolymerize the mucin glycoprotein oligomers by hydrolyzing the disulfide bonds that link the mucin monomers. This is usually accomplished by free thiol (sulfhydryl) groups, which hydrolyze disulfide bonds attached to cysteine residues of the protein core. The best known of these agents is NAC. No data convincingly demonstrate that any classic mucolytic, including NAC, improves the ability to expectorate mucus. Acetylcysteine can decrease mucus viscosity in vitro, but, because oral acetylcysteine is rapidly inactivated and does not appear in airway secretions, it is ineffective in vivo. Published evidence suggests that oral acetylcysteine may improve pulmonary function in selected patients with chronic suppurative lung disease, including COPD, but the clinical benefit observed is probably due to antioxidant properties. Daily use of acetylcysteine reduces the risk of re-hospitalization for COPD exacerbation by approximately 30%, but it does not modify the outcomes of COPD exacerbations [18, 22].

As a mucolytic agent, the clinical efficacy of NAC has gained recognition and attention. It reduces the viscosity of mucus by cleaving the disulfide bonds of mucins and the DNA fibers in the purulent sputum, leading to its efficacy under conditions where general expectorant medicines are ineffective. It also accelerates the ciliary movement within airway mucosa and stimulates the gastro-pulmonary vagal reflex, thereby promoting the excretion of mucus. In addition, NAC has comprehensive antioxidant, anti-inflammatory, anti-injury, anti-lipid oxidation, anti-platelet

aggregation, anti-mutagenesis and vasodilatory activities, and is able to protect anti-protease activity and inhibit allergic reactions, among others [18, 22, 23, 29].

S-Carboxymethylcysteine (carbocysteine or SCMC) is a mucoactive drug, has antioxidant and anti-inflammatory properties, and is commonly used for the treatment of COPD [23]. Pre-clinical and clinical studies on the pharmacological properties of SCMC have demonstrated that this cysteine derivative has the ability to increase the synthesis of sialomucins, important structural components of mucus. In effect, SCMC resets the balance between sialomucins and fucomucins, possibly by intracellular stimulation of sialyl transferase activity, restoring the viscoelastic properties of mucus. The antioxidant and anti-inflammatory protective effects of carbocisteine on bronchial cells are also relevant to its efficacy in the treatment of chronic airway inflammatory diseases [4, 9, 23].

As the most extensively used expectorant medicine in clinical practice, ambroxol has a very wide range of effects on the respiratory system. It is able to reduce the viscosity of sputum by inducing the bronchial glands to secrete serum and breaking up the mucopolysaccharide fibers of the mucin, which facilitates the penetration of antibiotics into the mucus and improves the local antibacterial effect. Simultaneously, ambroxol also induces alveolar type II cells to synthesize and secrete pulmonary surfactants that reduce the adhesion of the mucus to the cilia and accelerate the transport of mucus in the airway, which helps to expel the sputum and increase the airway mucosal clearance. In addition, ambroxol has specific antitussive, antioxidant and anti-inflammatory effects, along with a relatively significant inhibitory effect on histamine-induced constriction of the bronchial smooth muscle. Furthermore, it may also be used to prevent hyaline membrane disease in premature infants and to alleviate nitrosourea-induced pulmonary toxicity during the chemotherapy of malignant brain tumors [16, 24, 29].

Guaifenesin has no mucolytic action but may reduce bronchial sputum surface tension. No evidence is available to suggest antiseptic or anti-tussive effects. The main benefit offered by guaifenesin appears to be as an expectorant for the symptomatic treatment of coughs, producing small quantities of thick viscous

secretions. Guaifenesin can stimulate the cholinergic pathway and increase mucus secretion from the airway submucosal glands. However, guaifenesin has not been shown to be clinically effective in randomised controlled trials [4, 12].

The peptide mucolytics are designed specifically to depolymerize the DNA polymer (dornase alfa) or the F-actin network (eg, gelsolin, thymosin) and are most effective when sputum is rich in DNA pus. The only peptide mucolytic agent approved for use in the United States is dornase alfa (Pulmozyme) for the treatment of cystic fibrosis (CF) lung disease [22].

The majority of mucokinetic agents (sometimes referred to as cough clearance promoters) increase mucociliary clearance by acting on the cilia. Although a wide range of mucokinetics that increase ciliary beat frequency are available, these agents have little effect on mucociliary clearance in patients with pulmonary disease. Mucokinetic medications include broncodilators, tricyclic nucleotides and ambroxol. Surfactants also promote cough clearance of mucus by decreasing the surface adhesion between mucus and airway epithelium [4].

Antitussives are medicines that suppress coughing, also known as cough suppressants. Antitussives are thought to work by inhibiting a coordinating region for coughing located in the brain stem, disrupting the cough reflex arc. Indications for the use of antitussive drugs are those clinical conditions in which a dry, frequent cough is noted, leading to vomiting, sleep and appetite disturbances (painful, debilitating cough) [3, 8, 15].

Codeine is a naturally occurring alkaloid found in extracts of the poppy. Chemically codeine is morphine methylated in the 3 position, and when used in preparations for the treatment of cough, it is usually synthesized from the parent molecule. Codeine itself is regarded as a weak opioid, and its major therapeutic action is through catabolism in the liver by cytochrome P450 2D6 to morphine. CYP3A4 also contributes to codeine's metabolism to the active norcodeine. Codeine is therefore best regarded as a prodrug. Depending on the dose, it has a central depressant, analgesic, antianxiety, sedative and sometimes euphoric effect. Like all opiates, the active substance binds to supraspinal opioid receptors and thus

suppresses the cough center in the brainstem. Codeine may cause increased fatigue and drowsiness. Nausea may occur, especially at the beginning of treatment. In sensitive patients, visual-motor coordination and visual performance may be impaired. If respiratory function is impaired, pulmonary edema may develop when taking codeine. During therapy, codeine may cause euphoria [3].

Dextromethorphan HBr is the dextro-isomer of levorphanol methylether, and it is thought to bind to high- and low-affinity sites in the brain that are distinct from opioid and other neurotransmitter binding sites. Dextromethorphan affects the central part of the cough reflex, which reduces dry, unproductive cough associated with irritation of the respiratory mucosa in colds. The effect of dextromethorphan on the peripheral part of the cough reflex by suppressing impulses coming from the mucous membrane of the upper respiratory tract has also been noted. In terms of the severity of its antitussive effect, dextromethorphan is close to codeine, but, unlike it, it does not cause addiction, does not suppress the respiratory center and the activity of the ciliated epithelium of the respiratory tract, and is devoid of analgesic effect [3, 15].

The mechanisms of actions of herbal cough medicines are not always known. Most popular herbs used as cough medicines appear to be demulcents whose action is confined to the oropharynx. It is probable that the vast majority of allegedly effective herbal cough medicines act as non-specific emetic-expectorants. Likely that herbal cough medications will never be shown to be more active than placebos. Nevertheless, these plant products will continue to be popular remedies for patients and their health care advisors [13, 30].

Many herbal cough medicines are used as lozenges and pastilles. These popular products rely on the presence of soothing demulcents such as mucilages, many of which are acidic polysaccharides derived from uronic acid. Macromolecular hydrocolloids, including sugars and gum arabic, absorb fluid; as they dissolve they can produce a soothing covering in the throat, but they cannot give such protection to more distal sites of irritation or inflammation. Thus, they can reduce coughing

only if the symptom is a reflex response to hyperactive or irritated receptors in the oropharynx [13, 30].

Mucilage-containing herbs such as mallow, Iceland moss, mullein, and plantain are favored by herbalists, although their antitussive effects have not been adequately investigated. Saponins may have a surfactant effect, but these glycosidic molecules do not get absorbed in an active form from the bowel, and thus when taken orally they cannot exert a detergent effect on the mucous layer in the tracheobronchial tree. Moreover, saponins are bitter and irritating when given topically, and are not suitable for inhalation. Thus, saponin-containing herbs such as ivy, primula, soap bark, grindelia and senega roots are unlikely to have a marked mucolytic effect, but their reflex stimulation of mucous secretion may result in an accompanying antitussive effect. The essential oils of mint (menthol), eucalyptus (cineole), pine (pinene), myrtol (cineole, pinene and limonene), anise (anethole), thyme (thymol), turpentine (pinenes) and other popular herbal therapies can have an effect when given by mouth since they are absorbed into the blood stream and excreted by the lungs, where they may stimulate mucokinesis. However, their presence in cough medicines, teas, inhalants, rubs, and steam rooms is of unproven benefit with respect to a pharmacologic antitussive effect, although their extreme popularity suggests that they may have a physiologic action [13, 30].

Most OTC medicines combine various ingredients to treat more than one symptom of cough and upper respiratory infections. Cough syrups usually mix antitussives (such as dextromethorphan) and expectorants (such as guaifenesin) to help manage both dry and productive coughs. Cold and flu medicines can contain a mixture of antitussives, decongestants, antihistamines, and in some cases pain relievers to relieve a range of symptoms such as coughing, congestion, and sore throat [14, 24, 27].

1.4. Pharmaceutical care for cough

Responsible self-treatment is possible with the help of OTC drugs for coughs caused by acute respiratory diseases, laryngitis, tracheitis, acute bronchitis in the

initial stages, and when inhaling irritating substances (provided that the general condition is not impaired) [2, 15].

"Threatening" symptoms of cough that require immediate medical attention:

1. Cough lasts more than a week and its intensity increases.

2. Cough is accompanied by a persistent long-term (within 2 weeks) increase in temperature to 37.5–38 °C.

3. Cough is accompanied by a high (above 38–39 °C) temperature for 2 or more days.

4. Cough is accompanied by shortness of breath, chest pain when breathing.

5. Cough is accompanied by the discharge of thick greenish sputum.

6. Cough is accompanied by the discharge of sputum with blood streaks.

7. Cough is accompanied by attacks of suffocation.

8. Cough is accompanied by weakness, weight loss.

9. Cough is accompanied by profuse sweating (especially at night), fever.

10. Sudden attack of severe coughing.

11. Intense coughing for an hour without a break.

If the cough persists for 2 days after symptomatic treatment, it is imperative to consult a doctor [15, 21].

Treatment with acetylcysteine should be started with small doses (100–200 mg), because the effect of large doses can be unpredictable and lead to severe hypersecretion. Acetylcysteine can cause pulmonary hemorrhage, disrupt liver and kidney function, and cause bronchospasm in patients with bronchial asthma. Acetylcysteine is contraindicated in the first trimester of pregnancy, and is used thereafter only under strict indications and under the supervision of a physician. When taking acetylcysteine orally, antibiotics should be taken 2 hours after it [18, 22, 27].

Bromhexine and ambroxol can increase the activity of liver transaminases. These drugs are incompatible with alkaline solutions, with drugs containing codeine, with anticholinergics. Ambroxol increases the degree of penetration of antibiotics into the bronchial secretion and bronchial mucosa. Ambroxol is contraindicated in

the first trimester of pregnancy. Carbocysteine is not prescribed to persons with erosive-ulcerative lesions of the gastrointestinal tract [16, 20, 22].

Expectorant drugs should not be combined with drugs that suppress the cough reflex (antitussives of central and peripheral action) and with antihistamine drugs of the first generation that thicken sputum. Expectorant drugs are not prescribed simultaneously with drugs that dehydrate the patient's body (diuretics, laxatives, etc.). Expectorant drugs with reflex action (thermopsis herb, licorice root, marshmallow root, etc.) when the dose is exceeded can cause vomiting and are contraindicated in stomach diseases. Expectorant drugs must be washed down with a sufficient amount of alkaline liquid; it is recommended to drink 1.5–2 liters of liquid in addition to the physiological norm to compensate for physiological losses with sputum. Expectorant drugs are not prescribed to bedridden patients [12, 22, 25].

Antitussive drugs are not prescribed for increased bronchial secretion, abundant sputum. Antitussive drugs containing codeine, dextromethorphan and butamirate are not prescribed for children under 2 years of age, during pregnancy and lactation; when taken in large doses, for a long time or together with alcohol, these drugs can lead to depression of the CNS and breathing. Drugs containing dextromethorphan can cause lethargy, drowsiness, dizziness, therefore they are not prescribed to persons whose activities require increased concentration of attention [3, 13].

Tablets containing the topical antitussive prenoxdiazine should be swallowed without chewing, as they can cause loss of sensitivity of the oral and pharyngeal mucosa. Prenoxdiazine may cause dryness of the mouth and throat, and is not used in people with low blood pressure or in children under 6 years of age [12].

Conclusions to Chapter 1

1. Cough remains a serious clinical problem, both as a symptom of a range of other conditions such as asthma, chronic obstructive pulmonary disease, gastroesophageal reflux, and as a problem in its own resulting in sleep disturbance, nausea, chest pain. Patients with chronic cough often experience social

embarrassment, urinary incontinence, and low mood. There is a significant economic cost for the individual with cough and society when it leads to absence from work and lost productivity.

2. Treatment of cough, depending on its cause and type, involves the use of expectorants, mucolytics, antitussives, antihistamines, and other medications. Knowledge of the pharmacological properties, features of use, side effects, and contraindications to the use of these medications is absolutely essential for a modern pharmacist.

3. The participation of a pharmacist in the treatment process of cough allows to reduce the risk of complications, optimize therapy and provide patients with the appropriate level of medical care. That is why the role of pharmaceutical care in self-treatment of cough is extremely important and requires further development and improvement.

CHAPTER 2. RESEARCH METHODOLOGY AND ORGANIZATION

The tasks of the practical part of our work were to develop a questionnaire to survey pharmaceutical specialists and pharmacy students regarding their awareness of the clinical and pharmacological aspects of the rational use of over-the-counter drugs for the treatment of cough, conduct an anonymous survey among the specified audience, and analyze the respondents' responses.

In accordance with the tasks set, our study included three stages. The preparatory stage included the development of a questionnaire, the preparation of a Google form, and the formation of a sample of respondents. The data collection stage included the distribution of links to the developed Google form, conducting a survey, and monitoring of responses to the questionnaire. The analytical stage of the work was devoted to the processing of the obtained data, statistical analysis, and interpretation of the survey results.

In the first stage of the study, we developed a questionnaire with 28 questions, which consisted of 2 parts: general characteristics of the respondents (4 questions) and the main part, dedicated to studying the awareness of the respondents on the topic under study (24 questions). The first part of our questionnaire included questions regarding general information about the respondents, namely their demographic data (age, gender), country of residence, and occupation. The second part of the questionnaire consisted of questions aimed at assessing respondents' awareness of cough (causes of cough; cases in which responsible self-treatment of cough is possible; alarming symptoms of cough that require seeking medical attention), general recommendations for treating cough, main groups of drugs used in the treatment of cough, mechanisms of their action, range, features of use, side effects and contraindications to use. Special attention is paid to mucolytics, expectorants of various classes, and non-narcotic antitussives, as the main groups of OTC drugs used for the symptomatic treatment of chronic cough. At the end of the questionnaire, there are questions in which respondents are asked to independently assess their theoretical knowledge of pharmaceutical care when dispensing OTC

medications, as well as their interest in deepening their knowledge of pharmaceutical care when dispensing these medications. The full text of the questionnaire we developed is given in Appendix A.

The questionnaire contained 9 single-choice questions and 18 multiple-choice questions. In one question, respondents were asked to provide their own answer.

In April 2025, a survey of respondents was conducted to study their awareness of the rational use of medicines for the symptomatic treatment of allergies. The online survey was implemented using the Google Forms platform. 60 respondents - senior students and pharmacists – participated in the survey. We involved pharmacy students from two higher education institutions in the survey: the National University of Pharmacy (NUPh) and the Faculty of Medicine and Pharmacy of Rabat (FMPR), affiliated with the Mohammed V University (Morocco). Pharmacists from pharmacies located in Rabat and Sale cities (Rabat-Salé-Kénitra, Morocco) participated in the study: Pharmacie Cherifa, Pharmacie Al Jazeera, Pharmacie Merzouga, Pharmacie 20 Août, Pharmacie Hay Chemaou.

The study was conducted in compliance with ethical standards. Respondents' participation was completely voluntary and anonymous, and the data obtained were used exclusively in a generalized form and for scientific purposes. At the same time, we were fully aware of the existing limitations of the survey method used, such as the potential impact of the online format on the representativeness of the sample, the subjectivity of respondents' self-assessment of knowledge, and possible technical errors when filling out the questionnaire.

Conclusions to Chapter 2

In accordance with the research objectives, we developed a questionnaire consisting of 28 questions, determined a sample of respondents, and conducted an anonymous survey using Google Forms. The survey was attended by 60 respondents - senior students of the National University of Pharmacy and the Faculty of Medicine and Pharmacy of Rabat and pharmacists from Rabat and Salé cities (Rabat-Salé-Kénitra, Morocco).

CHAPTER 3. ASSESSMENT OF AWARENESS OF STUDENTS AND PHARMACY PROFESSIONALS REGARDING CLINICAL AND PHARMACOLOGICAL ASPECTS OF THE RATIONAL USE OF OTC DRUGS FOR THE TREATMENT OF COUGH

3.1. General characteristics of respondents

Based on the results of the survey, we analyzed the demographic characteristics of the respondents. The total number of survey participants was 60 people, which ensured sufficient representativeness of the sample to assess the awareness of students and pharmacists on the topic under study.

The age distribution of respondents (Fig. 3.1) showed that the vast majority of respondents (80%) are young people aged 20-25, which is typical for higher education applicants.

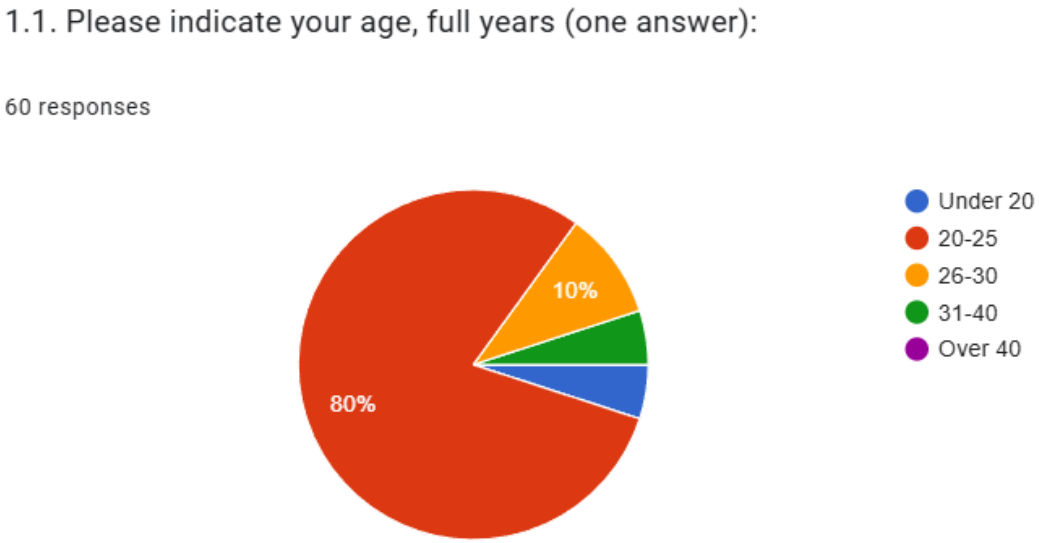

Fig. 3.1. Age distribution of respondents

As can be seen from the diagram (Fig. 3.2), the gender composition of the survey participants is characterized by a slight predominance of women (56.7%) over men (43.3%). This distribution generally reflects the situation among pharmacy students and pharmacists in Morocco, where men and women are in relative quantitative equality.

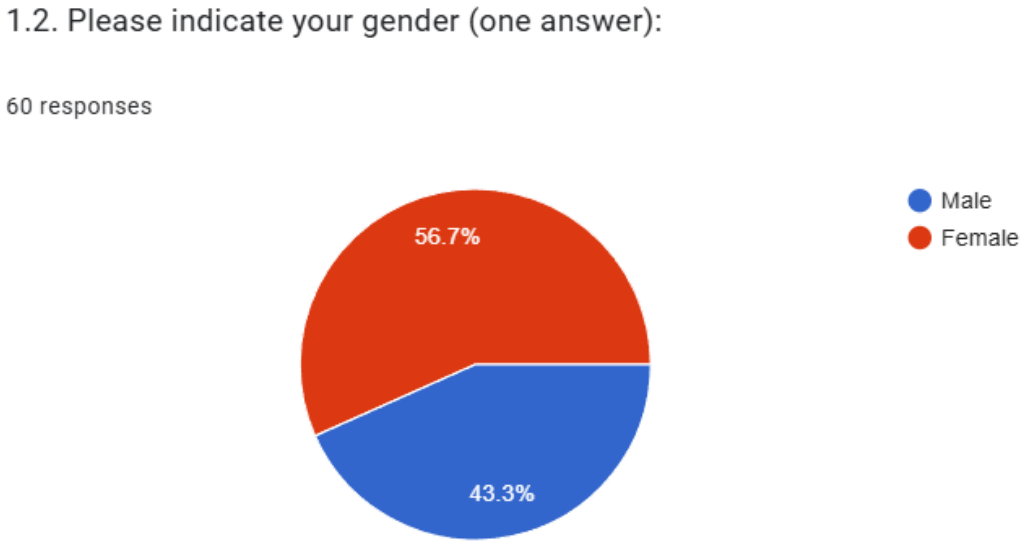

Fig. 3.2. Gender composition of study participants

The distribution by country of residence showed a significant predominance of respondents from Morocco (90%), which fully reflects the target audience of our study (Fig. 3.3). The survey also includes respondents from France and Germany.

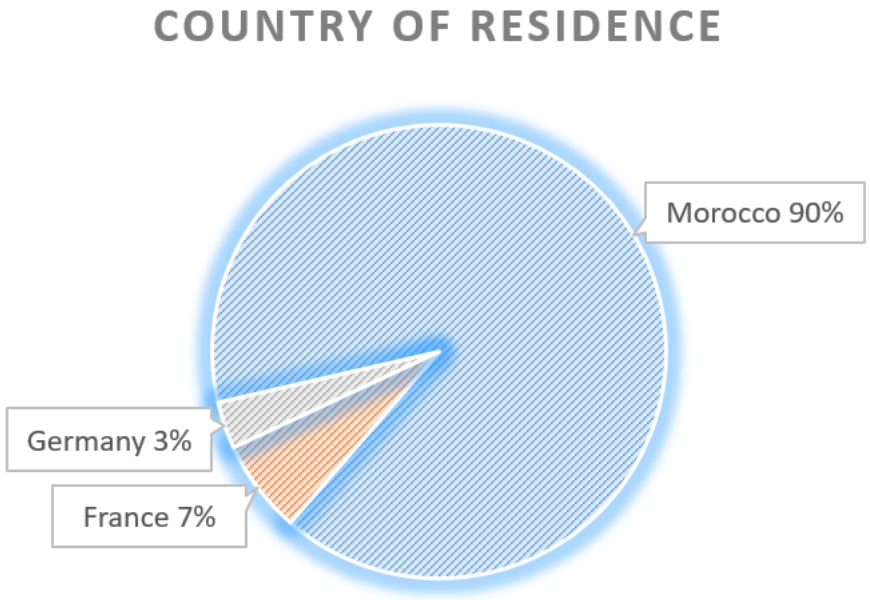

Fig. 3.3. Distribution of respondents by country of residence

The distribution of the survey participants by their occupation showed that 81.7% (49 people) of them were students studying pharmacy, and 18.3% (11 people) were practicing pharmacists from Morocco (Fig. 3.4). Among the students involved

in the survey were representatives of the National University of Pharmacy (23 people) and the Faculty of Medicine and Pharmacy of Rabat (26 people). Thus, the majority of respondents are senior students who have already studied most of the professionally oriented disciplines, such as pharmacology, pharmacognosy, pharmacotherapy with pharmacokinetics, and clinical pharmacy with pharmaceutical care, but do not yet have significant practical experience.

Fig. 3.4. Occupation of respondents

Summing up the general characteristics of the audience involved in our survey, we can conclude that the sample is sufficiently representative to assess the level of awareness of the participants regarding the research topic, which allows us to obtain a comprehensive picture of the level of formation of professional competencies of future and current pharmacists.

3.2. Study of respondents' awareness of the rational use of OTC drugs for the treatment of cough

The second part of the questionnaire consisted of questions aimed at assessing respondents' awareness of the causes of cough, general recommendations for its treatment, alarming symptoms of cough that require a visit to a doctor, diseases in which self-treatment of cough is permissible, the main groups of drugs used in the

treatment of cough, their mechanisms of action, range, features of use, side effects and contraindications to use.

In the first question of this part, we asked respondents to indicate the most significant causes of cough in their opinion (Fig. 3.5). According to the respondents' answers, these reasons, in their opinion, are (in order of decreasing frequency of responses): allergic reactions (65%), air pollution (56.7%), smoking (51.7%), inflammation of the upper respiratory tract (50%), respiratory viral infections (48.3%), bronchospasm (41,7%), chemical irritation of the upper respiratory tract (41,7%), mechanical irritation of the upper respiratory tract (35%), adverse climatic factors (30%), gastroesophageal reflux (21,7%).

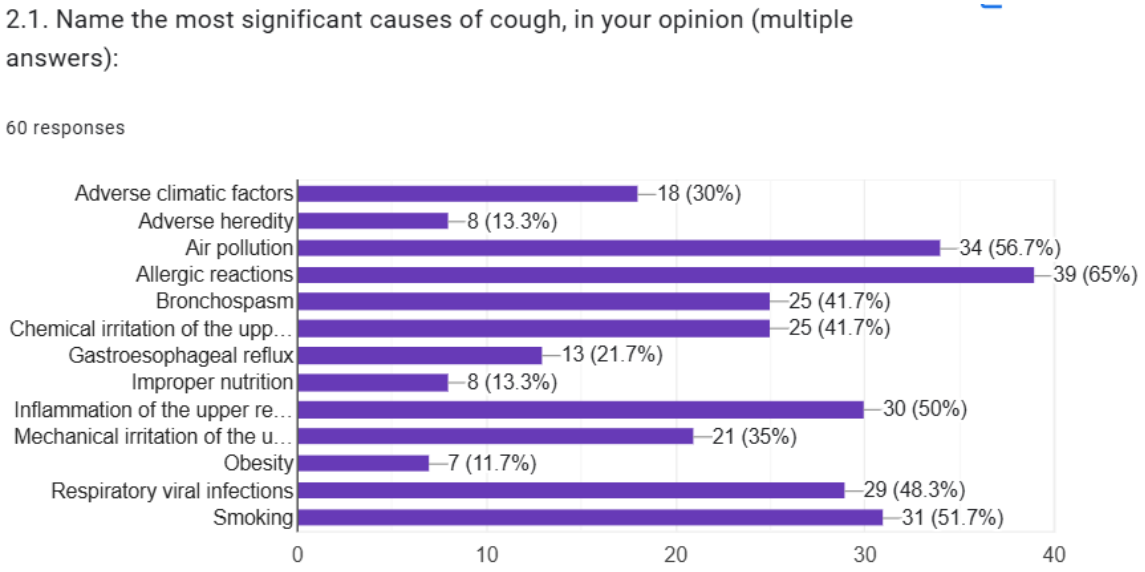

Fig. 3.5. The most significant causes of cough

Thus, respondents demonstrated significant awareness of the causes of cough, however, some of the answers were incomplete. This indicates opportunities to deepen students' knowledge on this issue.

In the next question, we found out the respondents' knowledge of alarming cough symptoms that require a visit to a doctor (Fig. 3.6). The correct options garnered the most responses, namely: “Cough is accompanied by high (above 38°-39°C) increase in body temperature for 2 or more days” (68.3%), “Cough is accompanied by attacks of shortness of breath, weakness, weight loss” (63.3%),

“Cough is accompanied by shortness of breath, chest pain when breathing” (56.7%), “Cough is accompanied by a persistent long-term (within 2 weeks) increase in body temperature to 37.5°-38°C” (55%), “Cough is accompanied by the release of thick greenish sputum or sputum with streaks of blood” (48,3%), “Cough is accompanied by profuse sweating (especially at night), fever” (41.7%), “Intense cough lasts for an hour without a break” (40%), “Cough lasts more than a week and its intensity increases” (38,3%), while the distractors had a very low response frequency.

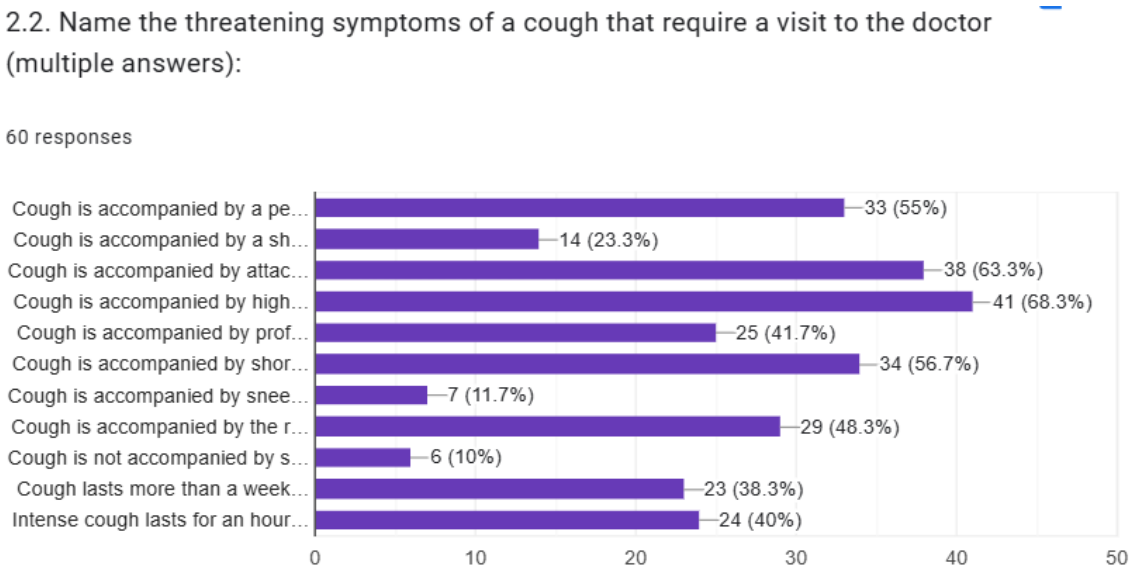

Fig. 3.6. The threatening symptoms of a cough

Therefore, the respondents' awareness of this issue can be considered satisfactory, but somewhat incomplete. A pharmacist's knowledge of the alarming symptoms of diseases and the ability to use this knowledge in the process of pharmaceutical care is absolutely essential.

The next question in our questionnaire was devoted to diseases in which self-treatment of cough is possible (Fig. 3.7).

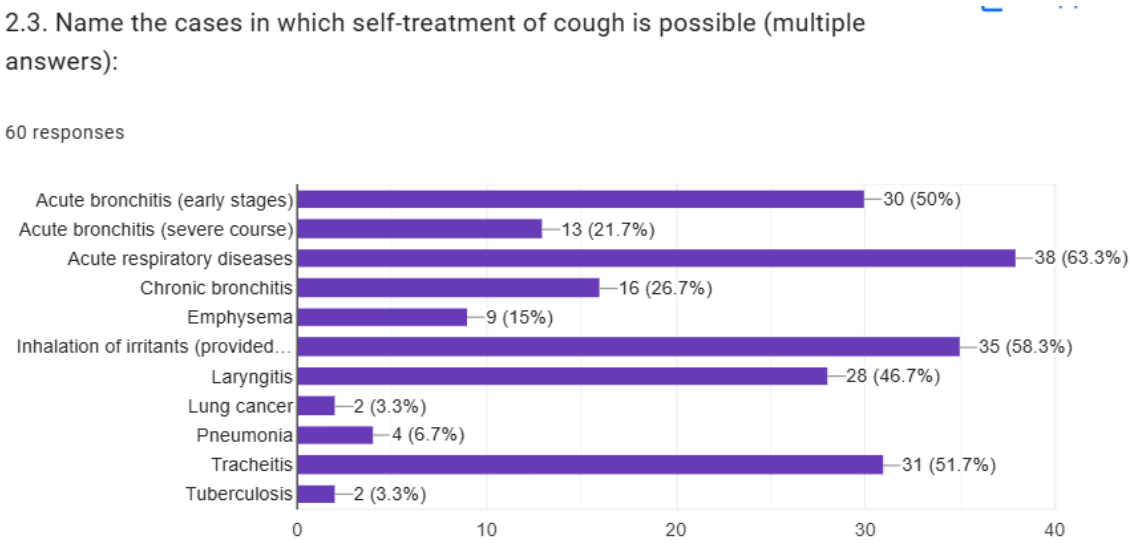

Fig. 3.7. The cases in which self-treatment of cough is possible

Respondents showed good awareness of this issue, choosing the following answer options with the highest frequency: “Acute respiratory diseases” (63.3%), “Inhalation of irritants (provided the patient's general condition is satisfactory)” (58.3%), “Tracheitis” (51.7%), “Acute bronchitis (early stages)” (50%), and “Laryngitis” (46.7%). However, chronic bronchitis, which in the remission phase can be treated symptomatically, was noted by only 26.7% of respondents, which again indicates a somewhat superficial knowledge on this issue.

According to the answers to the following question (Fig. 3.8), respondents are quite well informed about general recommendations for treating cough.

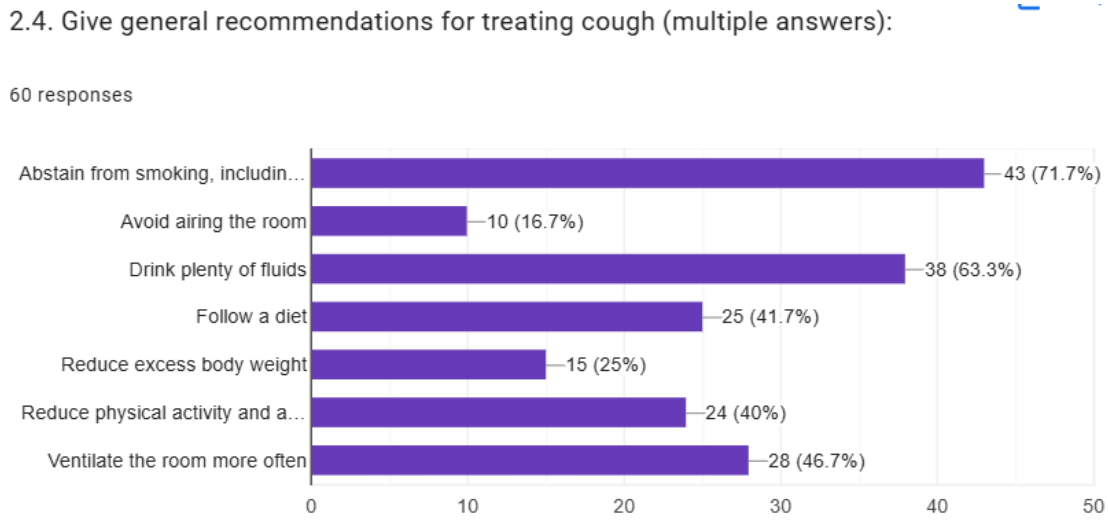

Fig. 3.8. General recommendations for treating cough

They recommend abstaining from smoking, including passive smoking (71.7%), drinking more fluids (63.3%), ventilating the room more often (46.7%), reducing physical activity, and staying in bed (40%). However, following a diet (41,7%) when coughing cannot be considered a reasonable recommendation.

In the next question, we asked respondents to identify drugs that belong to mucolytics (Fig. 3.9).

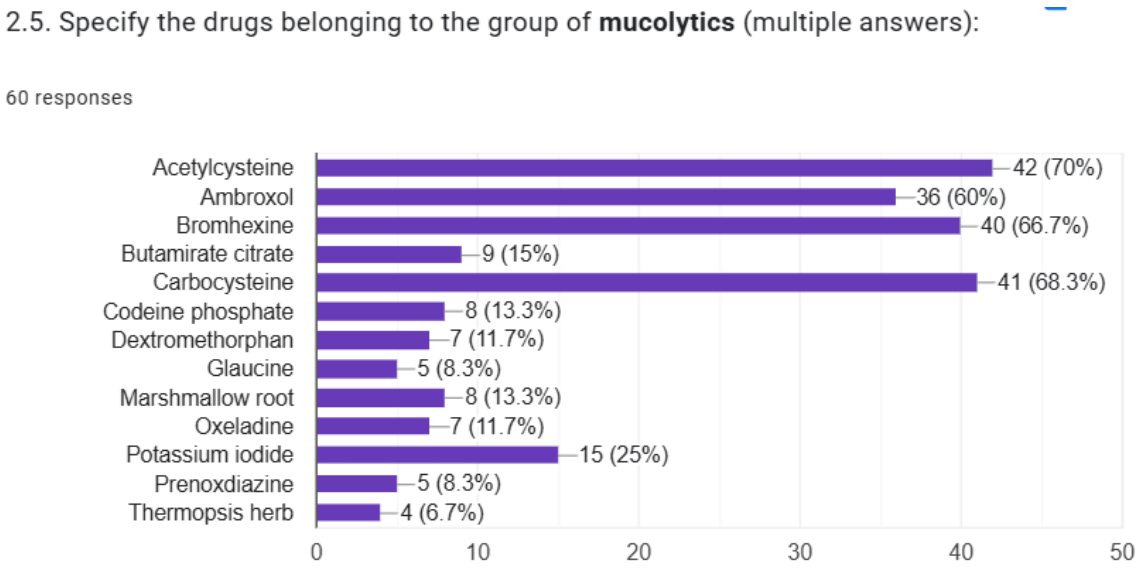

Fig. 3.9. The drugs belonging to the group of mucolytics

Respondents showed excellent awareness of this issue, confidently choosing the correct options: Acetylcysteine (70%), Carbocysteine (68.3%), Bromhexine (66.7%) and Ambroxol (60%).

In the next question of the questionnaire, we suggested determining the mechanism of action of direct-acting mucolytic agents (Fig. 3.10).

The vast majority of respondents (71.7%) chose the correct option – “Breaking of disulfide bonds of mucopolysaccharides of sputum, which leads to a decrease in its viscosity”, which indicates high awareness of the mechanism of action of these drugs.

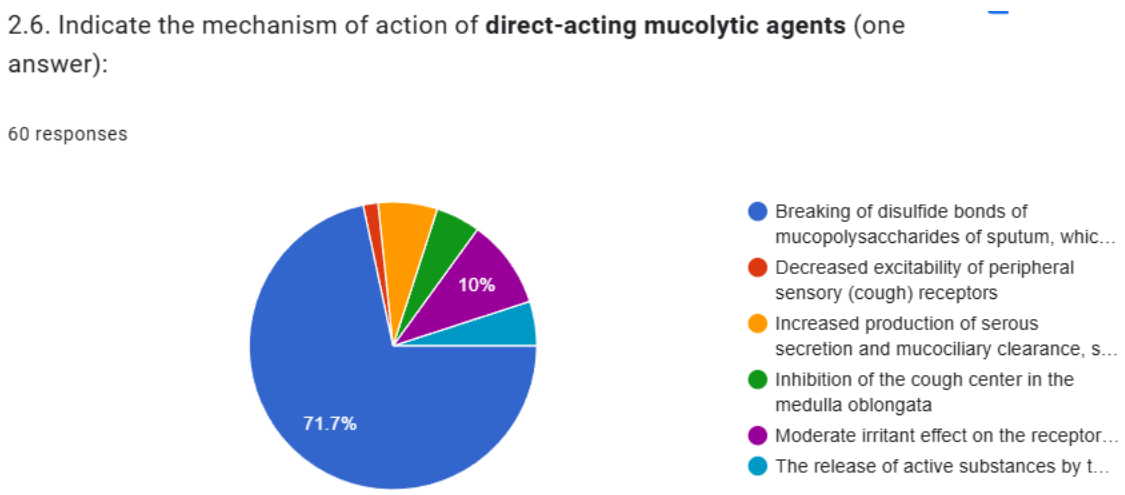

Fig. 3.10. The mechanism of action of direct-acting mucolytic agents

In the next question, we asked respondents to indicate the features of the use of acetylcysteine drugs (Fig. 3.11).

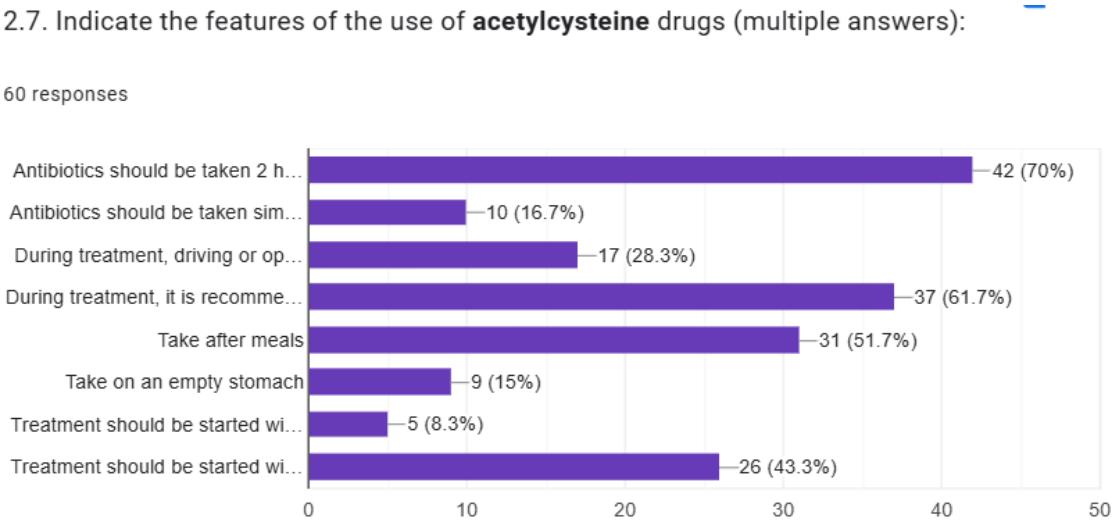

Fig. 3.11. The features of the use of acetylcysteine

Most of the respondents chose the correct options: “Antibiotics should be taken 2 hours after acetylcysteine” – 70%, “During treatment, it is recommended to increase fluid intake” – 61,7%, “Take after meals” – 51,7%. Some difficulties arose only with the issue of drug dosage at the beginning of treatment: only 43.3% of respondents indicated the correct option “Treatment should be started with small doses (100-200 mg)”.

The next question was devoted to the possible side effects of acetylcysteine (Fig. 3.12).

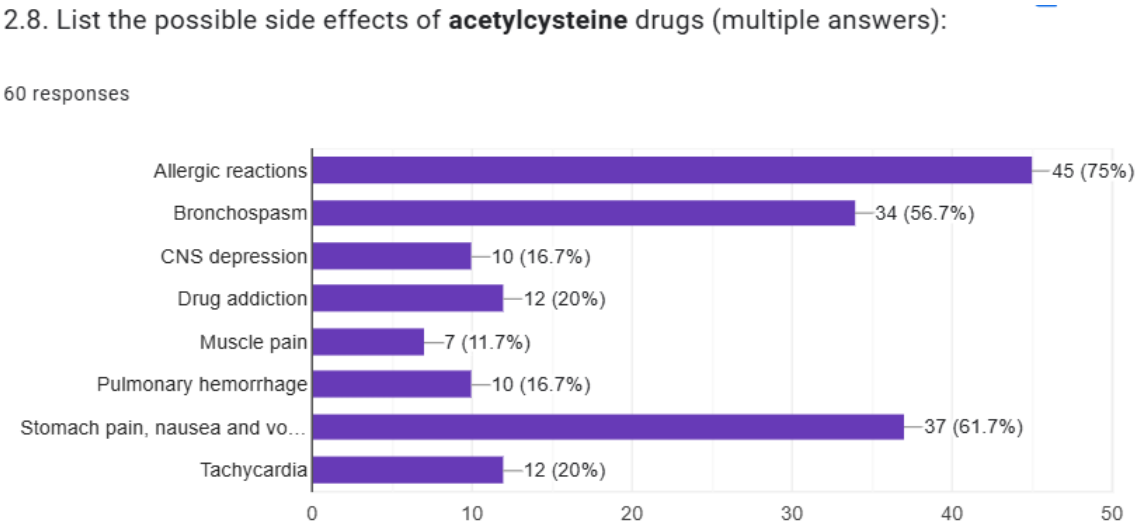

Fig. 3.12. The possible side effects of acetylcysteine

Respondents accurately indicated the main side effects of this medication, as listed in the instructions for use, namely allergic reactions (75%), stomach pain, nausea and vomiting (61.7%), bronchospasm (56.7%).

Respondents' awareness of the main contraindications to the use of acetylcysteine was somewhat lower (Fig. 3.13).

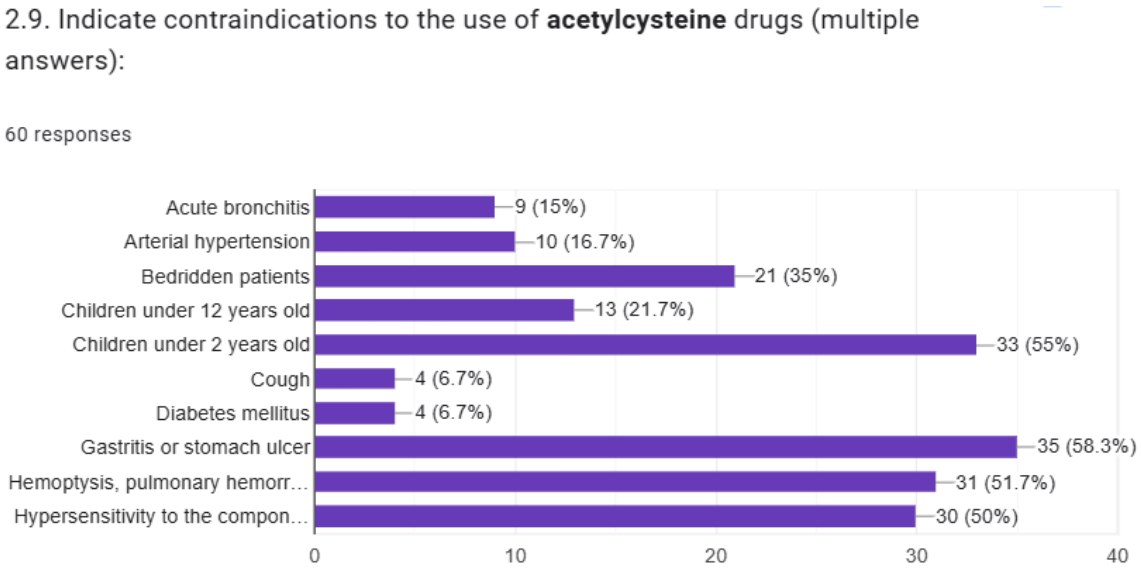

Fig. 3.13. The contraindications to the use of acetylcysteine

In particular, the option " Gastritis or stomach ulcer" was indicated by 58.3% of respondents, “Children under 2 years old” – 55%, “Hemoptysis, pulmonary hemorrhage” – 51.7%, “Hypersensitivity to the components of the drug” – 50%. 35% of respondents indicated the option " Bedridden patients", which is not always reflected in the instructions, but is advisable to prevent aspiration.

In the next question, respondents had to determine the mechanism of action of the indirect-acting mucolytic drug – ambroxol (Fig. 3.14).

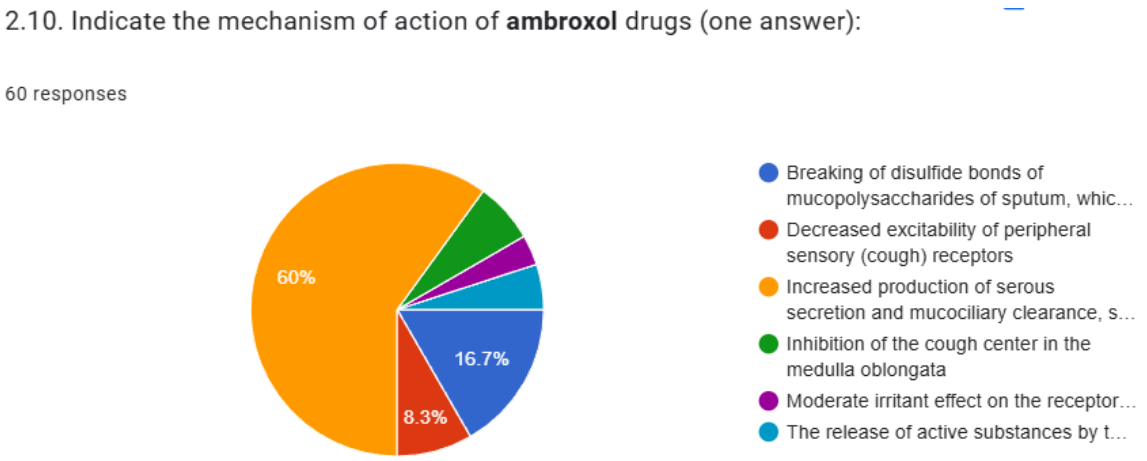

Fig. 3.14. The mechanism of action of ambroxol

Most respondents chose the correct option – “Increased production of serous secretion and mucociliary clearance, stimulation of surfactant synthesis and secretion” (60%). Among the distractors, the most frequent options were “Breaking of disulfide bonds of mucopolysaccharides of sputum, which leads to a decrease in its viscosity” (mechanism of action of direct-acting mucolytics) – 16.7% and “Decreased excitability of peripheral sensory (cough) receptors” (mechanism of action of peripherally acting antitussives) – 8.3%.

The next two questions of the questionnaire also concerned the mechanisms of pharmacological action of expectorants with resorptive action (Fig. 3.15) and herbal expectorants (Fig. 3.16).

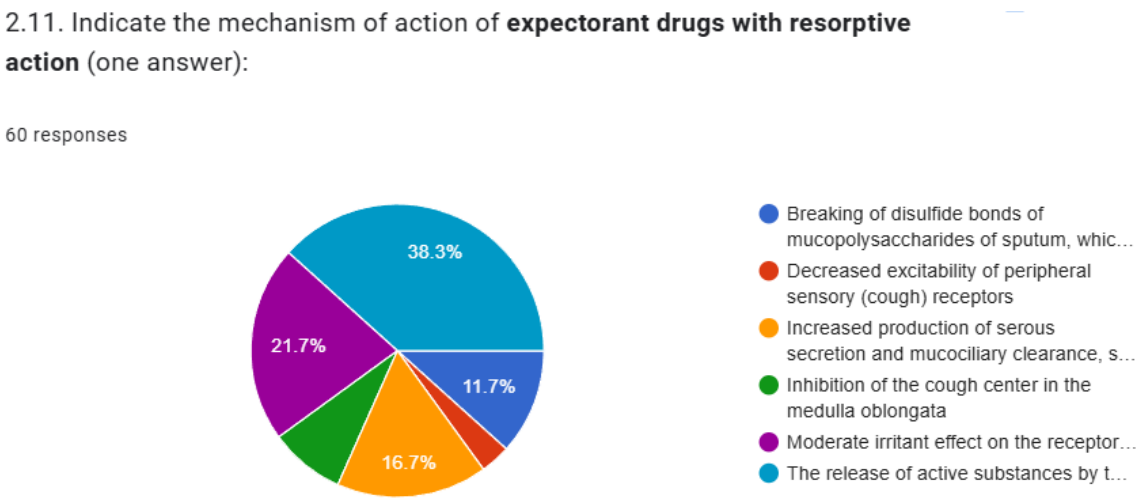

Fig. 3.15. The mechanism of action of expectorans with resorptive action

The question about the mechanism of action of expectorants with resorptive action (such as potassium iodide, ammonium chloride, sodium bicarbonate) turned out to be the most difficult for respondents - only 38.3% indicated the correct answer "The release of active substances by the bronchial glands, which leads to stimulation of their secretion, liquefaction of sputum and activation of the motor function of the bronchial epithelium".

Among the distractors to this question, respondents most often chose "Moderate irritant effect on the receptors of the gastric mucosa, which causes a reflex increase in the secretion of bronchial glands, ciliary movement of the bronchial epithelium and peristalsis of the bronchioles" (main mechanism of action of herbal expectorants) – 21.7%, "Increased production of serous secretion and mucociliary clearance, stimulation of surfactant synthesis and secretion" (mechanism of action of ambroxol) – 16.7% and "Breaking of disulfide bonds of mucopolysaccharides of sputum, which leads to a decrease in its viscosity" (mechanism of action of direct-acting mucolytics).

As for the question about the mechanism of action, the respondents answered it somewhat better (48.3% of correct answers), however, more than half of the study participants still chose different distractors (see Fig. 3.16).

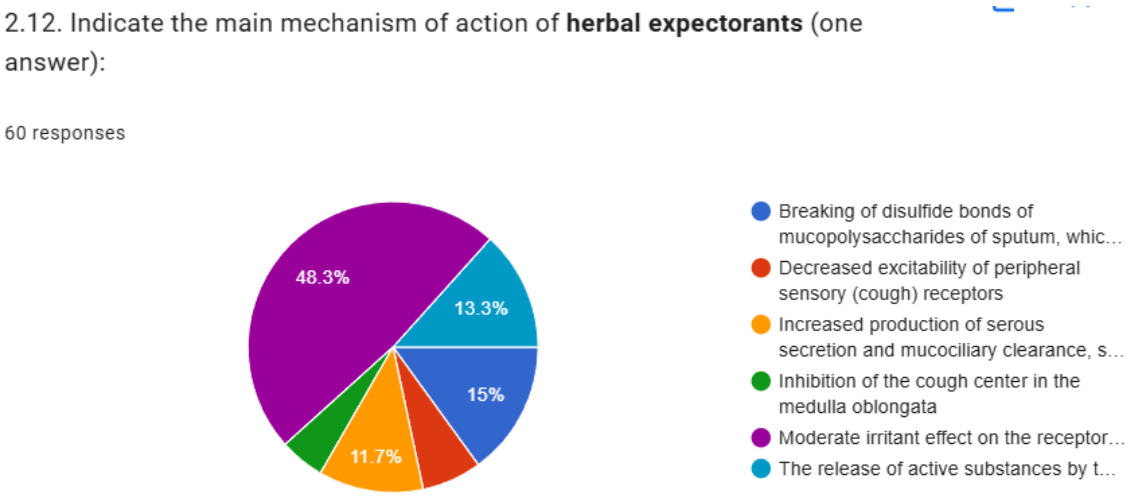

Fig. 3.16. The main mechanism of action of herbal expectorants

The results obtained indicate insufficient awareness of the respondents about the mechanisms of action of expectorants and the necessity of in-depth study of these issues in pharmacology and clinical pharmacy classes.

In the next question, we asked the survey participants to indicate the medicinal plant raw materials known to them and used in the composition of herbal medicines for the treatment of cough (Fig. 3.17).

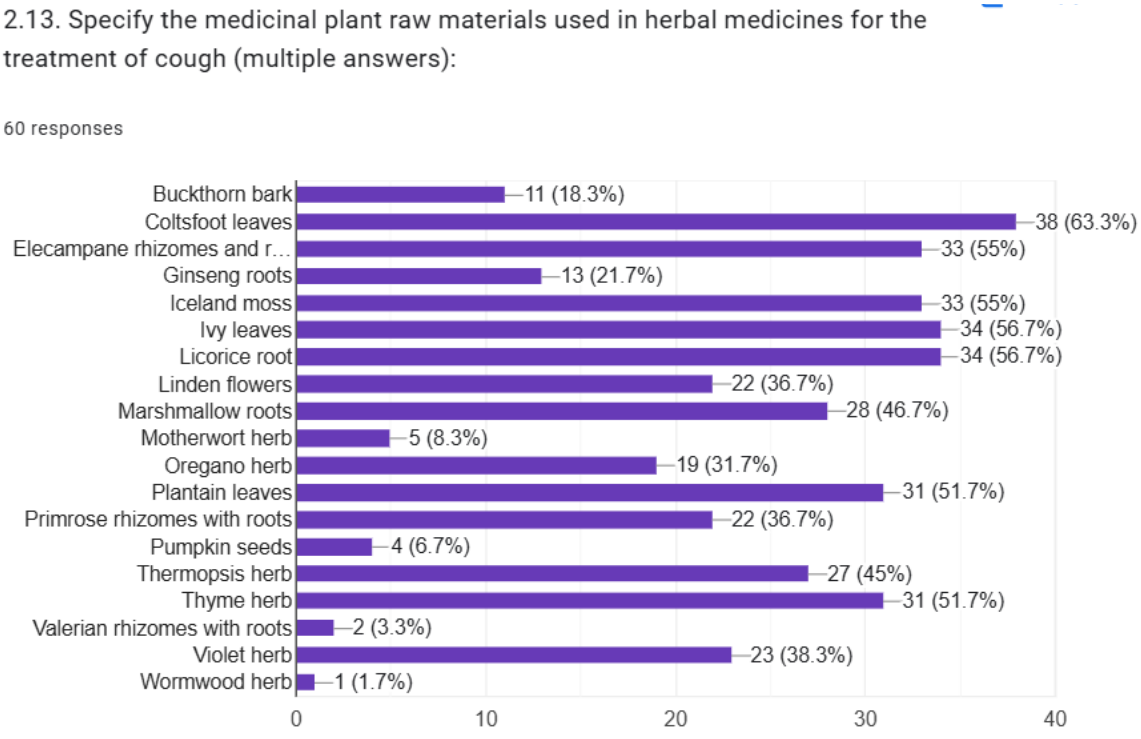

Fig. 3.17. The medicinal plant raw materials used in herbal medicines for the treatment of cough

The most familiar to the surveyed audience were the following types of medicinal plant raw materials: Coltsfoot leaves (63.3%), Ivy leaves (56.7%), Licorice root (56.7%), Elecampane rhizomes and roots (55%), Iceland moss (55%), Plantain leaves (51.7%) and Thyme herb (51.7%). Other correct answers were given by less than half of the respondents, but still had a fairly high frequency: Marshmallow roots (46.7%), Thermopsis herb (45%), Violet herb (38.3%), Linden flowers (36.7%), and Primrose rhizomes with roots (36.7%). Distractors elicited significantly fewer responses. The results obtained indicate that respondents have a satisfactory knowledge of the composition of herbal medicines used to treat cough.

The next question concerned medications that are incompatible with expectorants (Fig. 3.18).

The vast majority of respondents correctly chose centrally acting antitussives (73.3%). Other correct options – first-generation antihistamines and peripheral antitussives – were indicated by 45% of respondents. Distractors elicited significantly fewer responses.

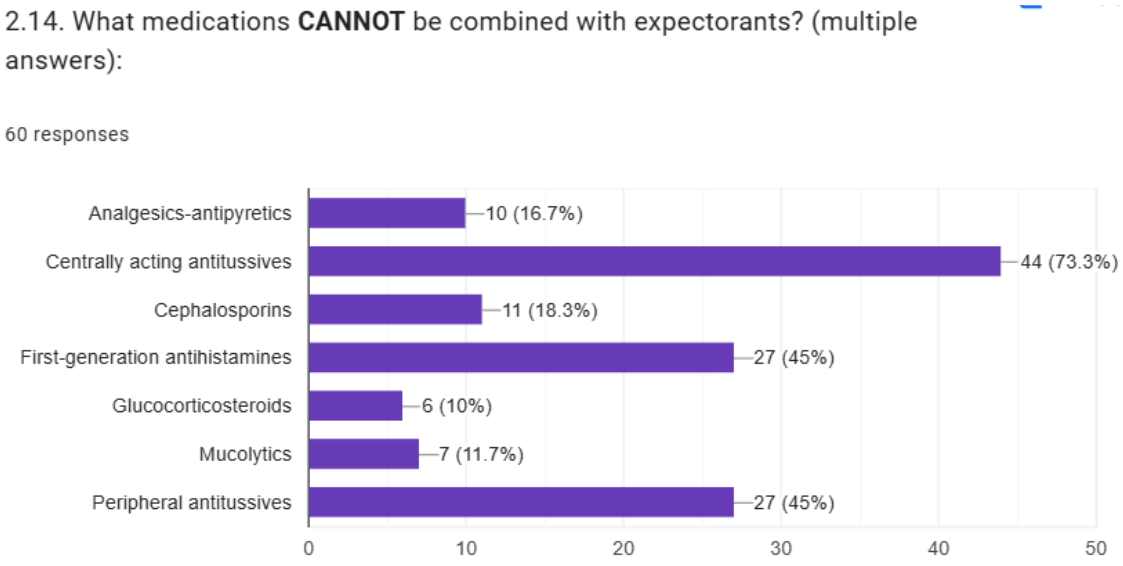

Fig. 3.18. Medications that should not be combined with expectorants

The next two questions of the questionnaire were devoted to possible side effects and contraindications to the use of herbal expectorants (Fig. 3.19 – 3.20).

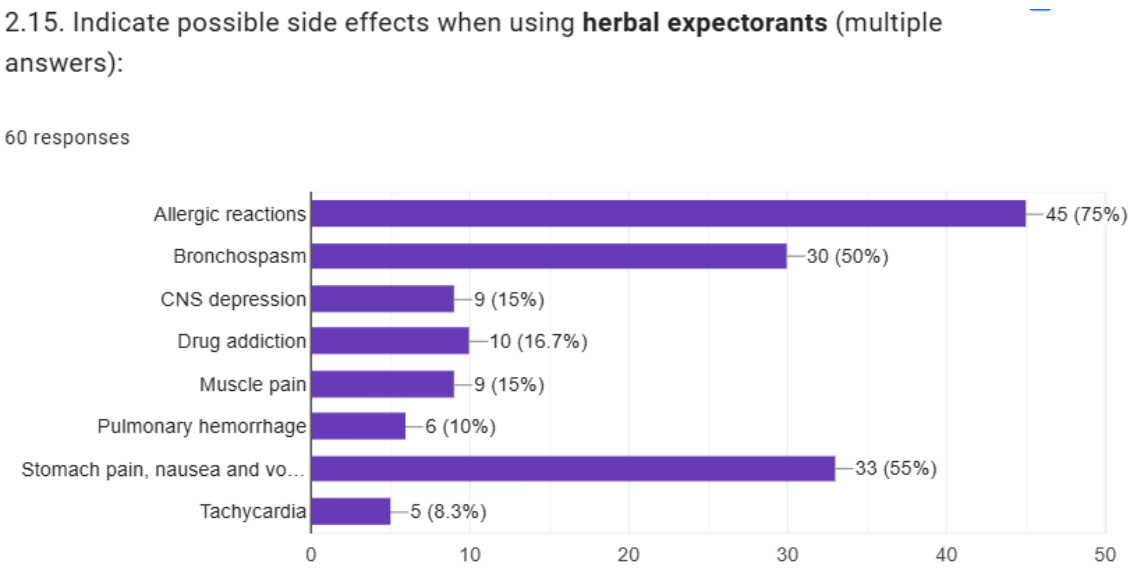

Fig. 3.19. Possible side effects of herbal expectorants

Most respondents chose the correct options – allergic reactions (75%) and symptoms of gastrointestinal mucosa irritation – stomach pain, nausea and vomiting (55%). Half of the respondents also reported bronchospasm, possibly attributing it to allergic manifestations. Herbal preparations do indeed have high allergenicity, including cross-allergenicity.

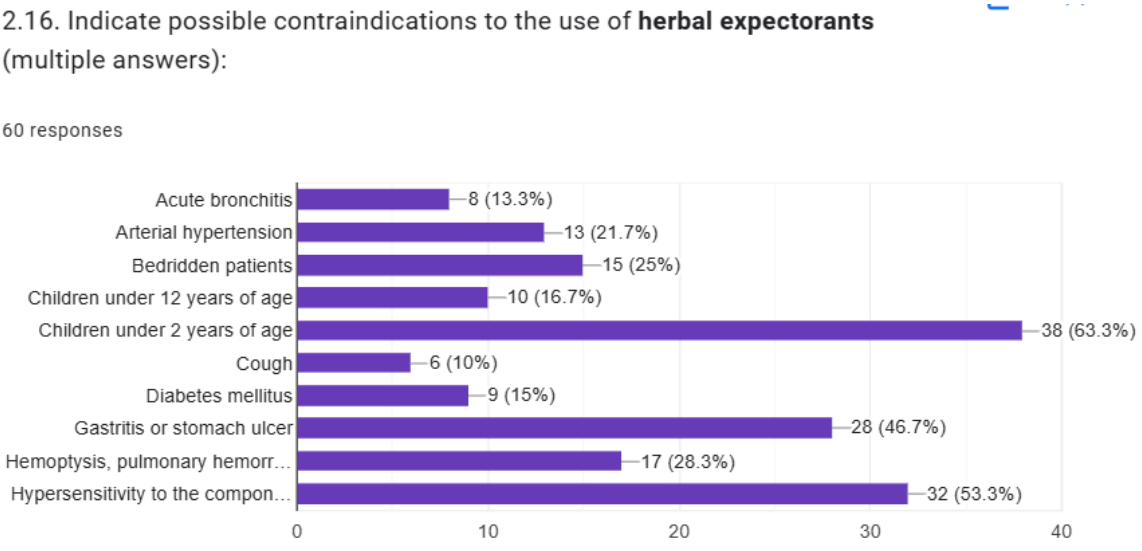

Fig. 3.20. Possible contraindications to the use of herbal expectorants

Regarding possible contraindications, respondents also chose the correct options – children under 2 years of age (63.3%), hypersensitivity to the components

of the drug (53.3%), gastritis or stomach ulcer (46.7%). Also, some of the respondents reasonably noted hemoptysis (28.3%) and bedridden patients (25%) as possible contraindications. Indeed, in these conditions, expectorants should be used very carefully.

The next question was about the mechanism of action of centrally acting antitussive drugs (Fig. 3.21). Two-thirds of respondents indicated the correct option – "Inhibition of the cough center in the medulla oblongata", which indicates a fairly high level of audience awareness on this issue.

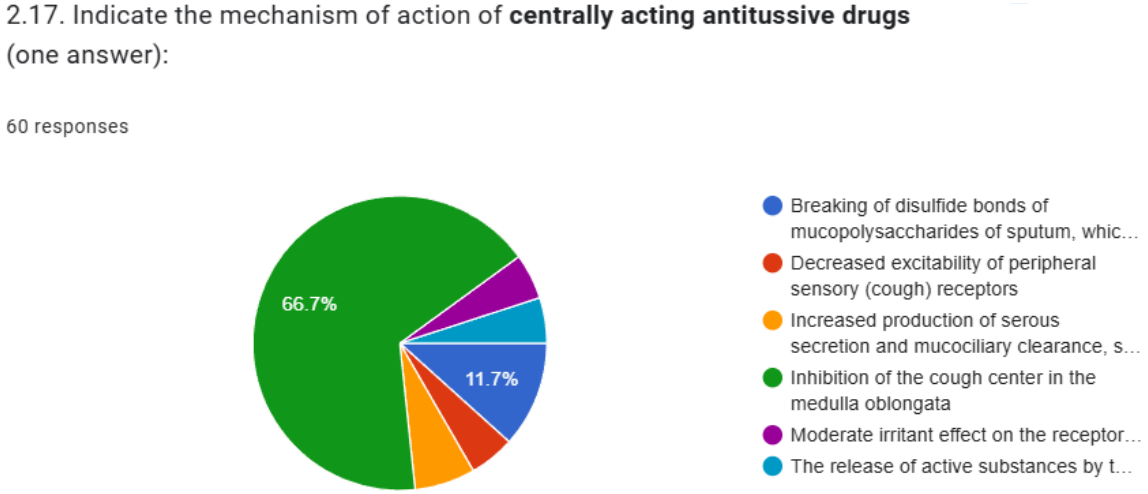

Fig. 3.21. The mechanism of action of centrally acting antitussive drugs

In the question 2.18, survey participants were asked to choose an over-the-counter antitussive from the options provided (Fig. 3.22). Most respondents correctly identified butamirate citrate (61.7%), dextromethorphan (51.7%), and oxeladine (51.7%). Glaucine (36.7%) and peripherally acting antitussive drug prenoxdiazine (35%) were less known to the respondents. Among the distractors, marshmallow roots (23.3%), thermopsis herb (23.3%), and acetylcysteine (21.7%) received the most responses. The results obtained show that respondents are generally familiar with the main antitussive drugs, but their knowledge is not very confident.

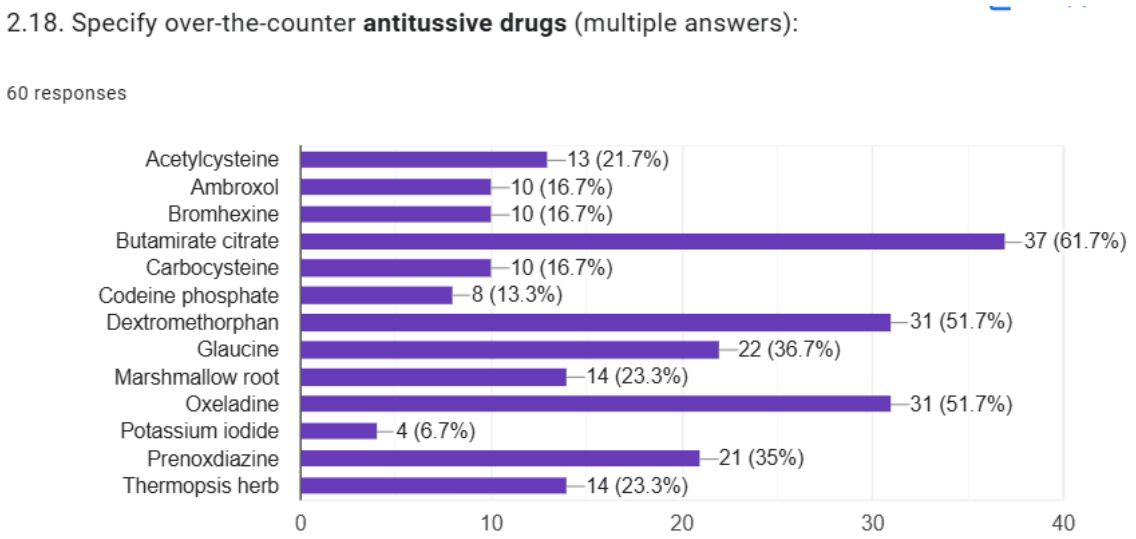

Fig. 3.22. Over-the-counter antitussive drugs

The next two questions were devoted to the possible side effects and contraindications to the use of OTC centrally acting antitussives (Fig. 3.23 – 3.24).

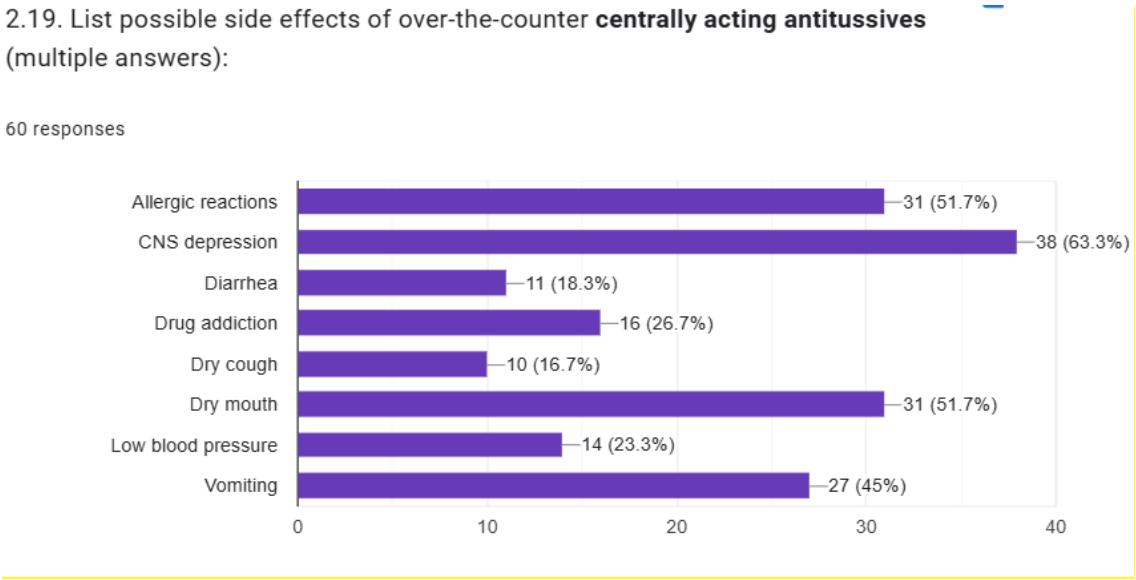

Fig. 3.23. Possible side effects of OTC centrally acting antitussives

Respondents identified the following possible side effects of over-the-counter centrally acting antitussives: CNS depression (63.3%), allergic reactions (51.7%), dry mouth (51.7%), vomiting (45%). However, such side effects as diarrhea (18.3%) and decreased blood pressure (23.3%) were underestimated. At the same time, some of the interviewees indicated the possibility of drug addiction (26.7%), which is uncharacteristic for non-narcotic antitussives.

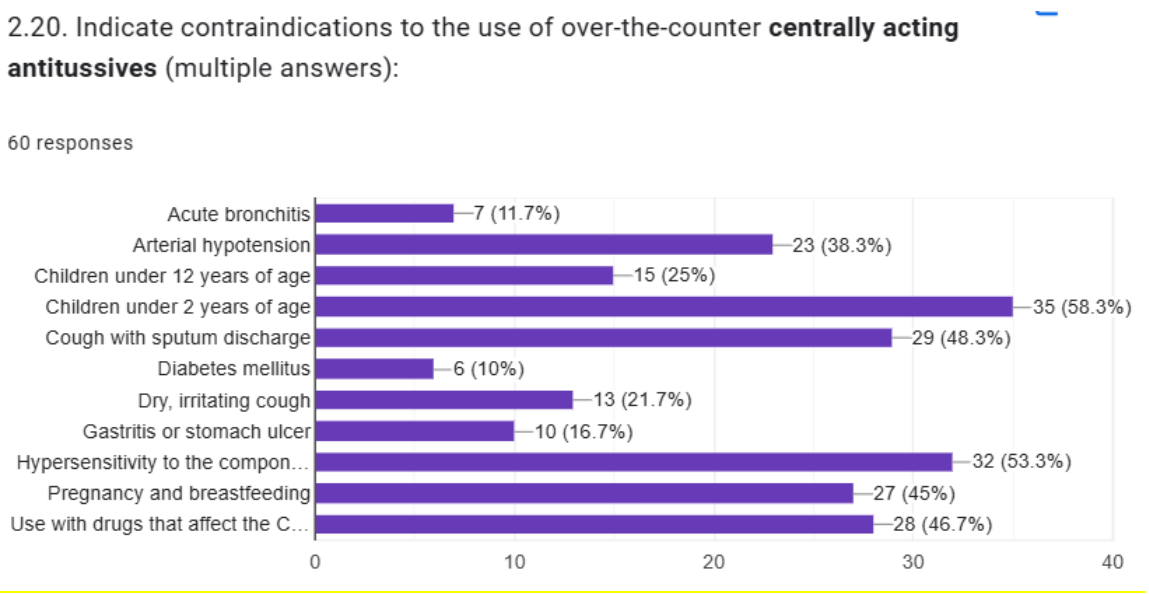

Fig. 3.24. Contraindications to the use of OTC centrally acting antitussives

As for contraindications to the use of OTC centrally acting antitussives, the following options received the largest number of responses from respondents: “Children under 2 years of age” – 58.3%; “Hypersensitivity to the components of the drug” – 53.3%; “Cough with sputum discharge” – 48.3%; “Use with drugs that affect the CNS or alcohol” – 46.7%; “Pregnancy and breastfeeding” – 45%; “Arterial hypotension” – 38.3%. These answers fully correspond to the main contraindications to OTC centrally acting antitussives specified in the instructions for their use.

We can conclude that respondents are generally aware of the side effects and contraindications to the use of OTC centrally acting antitussive drugs, but their answers are incomplete and half-hearted.

Question 2.21 concerned the dosage forms of OTC cough medications available on the pharmaceutical market (Fig. 3.25).

The most familiar among these dosage forms for our respondents was syrup (63.3%). Other correct answer options, such as oral solution, effervescent tablets, liquid extract, tablets, coated tablets, lozenges and pastilles, received about half of the respondents' votes (53.3 – 46.7%). Distractors such as injection solution and suppositories elicited only a small number of responses.

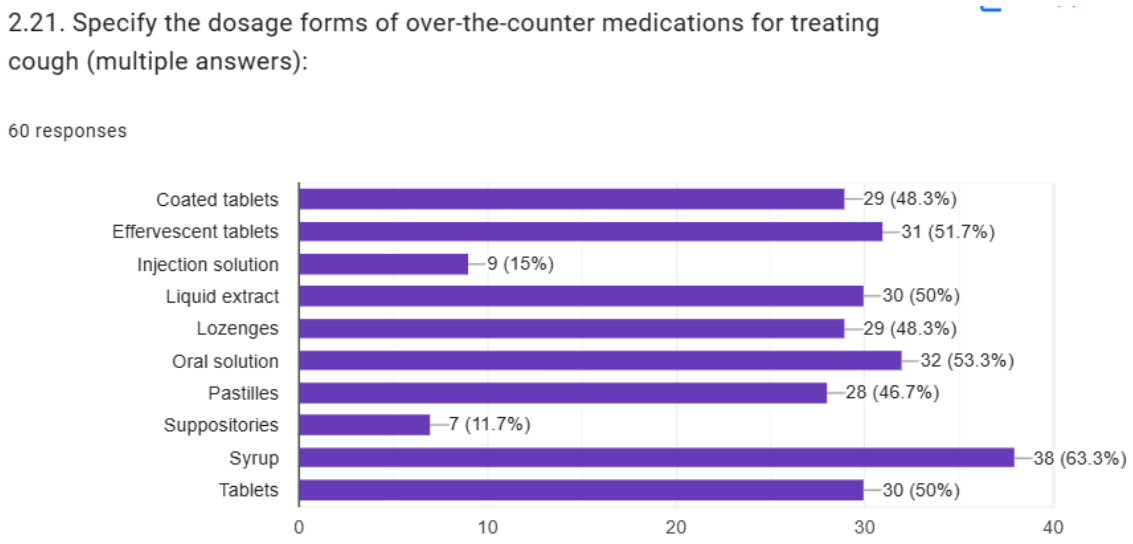

Fig. 3.25. The dosage forms of OTC medications for treating cough

The next question was devoted to the specifics of the use of cough syrups (Fig. 3.26). Respondents quite correctly identified all the main features of the use of this dosage form: “After opening the bottle, use no longer than the period specified in the instructions, even if the expiration date has not yet expired” – 63,3%; “Keep out of reach of children” – 61,7%; “Use a measuring spoon for easy dosing” – 58.3%; “Shake well before use” – 55%; “Drink plenty of warm drinks during use” – 53,3%; “Consider the composition of excipients when used by patients with diabetes” – 50%; “Use several times a day after meals” – 46.7%.

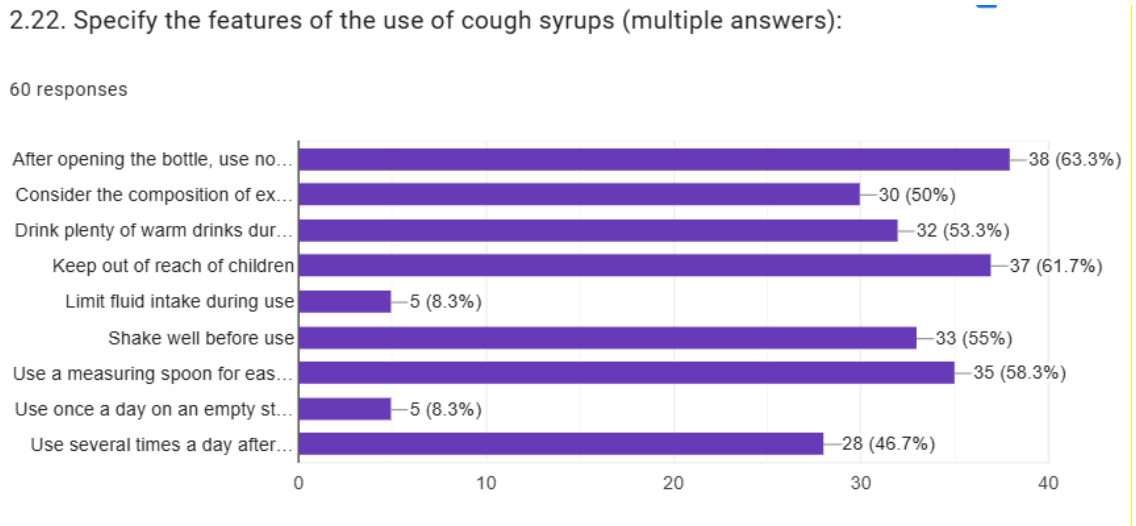

Fig. 3.26. The features of the use of cough syrups

We can note the good awareness of the surveyed audience on this issue, but we would like to draw attention to the lack of completeness of many answers.

In the last two questions of the questionnaire, we invited respondents to independently assess their theoretical knowledge of pharmaceutical care during the dispensing of OTC drugs used for the symptomatic treatment of cough, and also to indicate their interest in improving their knowledge on this issue (Fig. 3.27–3.28).

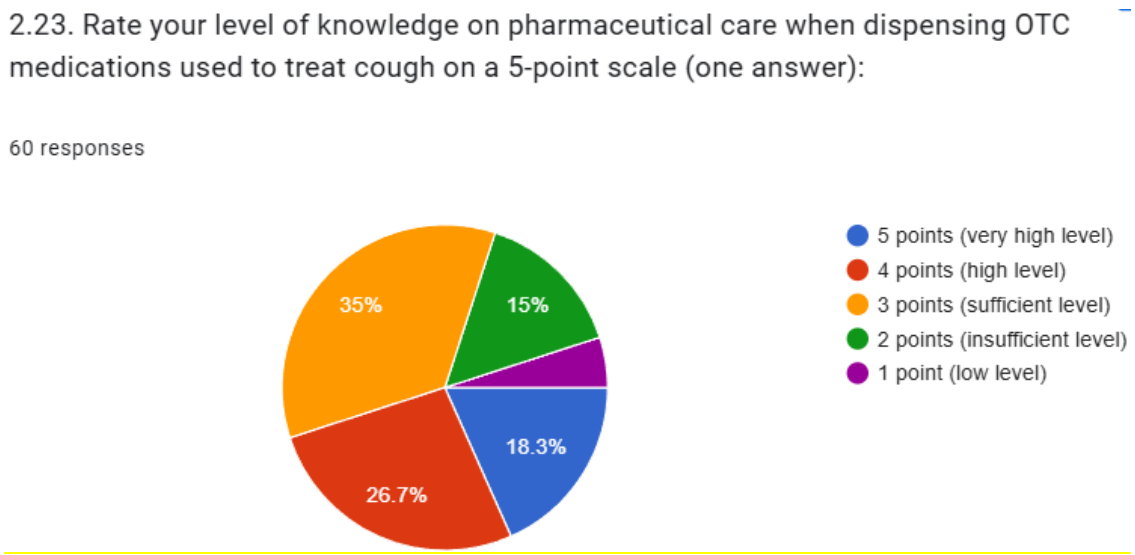

Fig. 3.27. Respondents' self-assessment of their theoretical knowledge on the issues of the pharmaceutical care when dispensing OTC drugs used for the treatment of cough

The results of the self-assessment demonstrate a critical perception by respondents of their own level of theoretical knowledge on the issue under study. The predominance of scores of 3-4 points (sufficient and high level of knowledge) indicates their awareness of the need for constant deepening and improvement of professional knowledge. Such self-criticism is a positive feature of future and current pharmaceutical professionals, as it reflects their desire for continuous professional development.

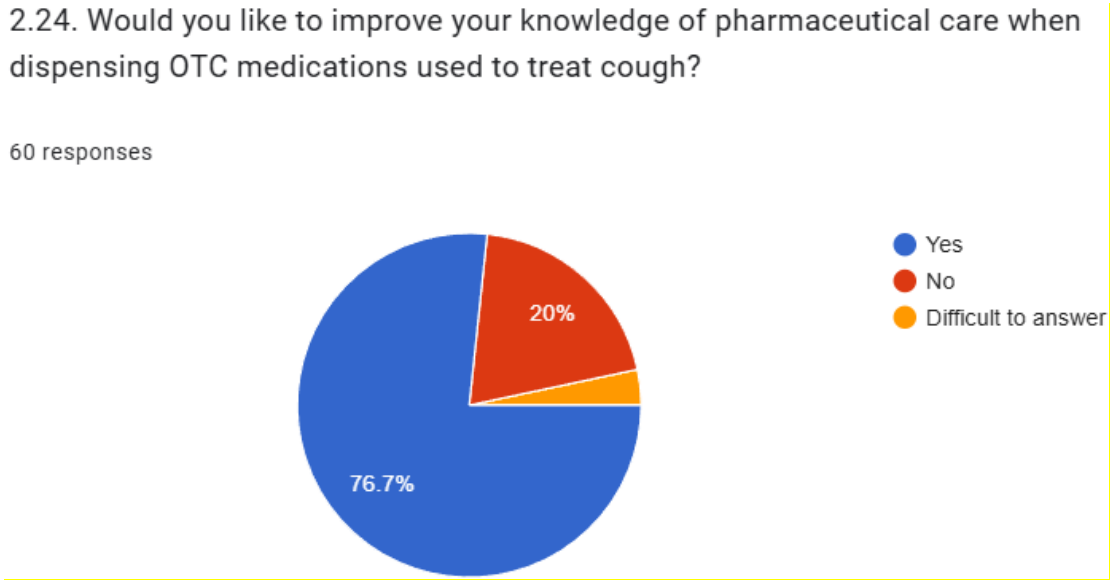

Fig. 3.28. Respondents' interest to improve their knowledge about the pharmaceutical care when dispensing OTC drugs used for the treatment of cough

The vast majority of respondents (76.7%) expressed their interest in deepening their knowledge of pharmaceutical care when dispensing OTC medications used to treat cough. This indicates their high motivation for professional growth and their awareness of the importance of continuous learning. The desire of students and pharmacists to improve their competence is a guarantee of improving the quality of pharmaceutical care in the future.

Comparing the responses to the questionnaire of students and practicing pharmacists, we can note the greater accuracy of the pharmacists' responses. In particular, they were significantly better (according to Fisher's exact test) at answering single-answer questions concerning the mechanisms of action of different groups of drugs (Table 3.1). At the same time, no statistically significant differences were noted in the responses of students of the NUPh and the FMPR to these questions, although students from the NUPh answered them somewhat better.

The responses of practicing pharmacists to multiple-choice questions were also more complete and accurate (they selected a higher number of correct answers than the students). This difference can be explained by their experience of daily work

in pharmaceutical care of patients with various diseases, including those whose symptom is cough.

Table 3.1

Comparison of student and pharmacist responses to single-answer questions

Question	% of correct answers of students	% of correct answers of pharmacists	Statistical significance of differences according to Fisher's exact test
2.6. Indicate the mechanism of action of direct-acting mucolytic agents	69.4	90.9	φ = 1.679 p = 0.0466
2.10. Indicate the mechanism of action of ambroxol drugs	55.1	81.8	φ = 1.761 p = 0.0391
2.11. Indicate the mechanism of action of expectorant drugs with resorptive action	28.6	81.8	φ = 3.395 p = 0.0003
2.12. Indicate the main mechanism of action of herbal expectorants	42.9	81.8	φ = 2.497 p = 0.0063
2.17. Indicate the mechanism of action of centrally acting antitussive drugs	61.2	90.9	φ = 2.193 p = 0.0141

A larger proportion of pharmacists responded positively to the question about their interest in deepening their knowledge of the research topic (81.8% versus 75.5% of students), which indicates their awareness of the importance of continuous learning and improving their professional knowledge.

Conclusions to Chapter 3

1. Based on the results of the survey, the demographic characteristics of the respondents were analyzed, namely gender, age, country of residence and occupation. The total number of survey participants was 60 people including students and pharmacists.

2. Based on the analysis of the survey results, we assessed the awareness of the surveyed audience regarding general recommendations for treating cough, the main groups of drugs used in treating cough, their mechanisms of action, range, features of use, side effects and contraindications to use, as well as issues related to pharmaceutical supervision during the dispensing of such drugs.

3. Based on the results of our study, we can conclude that respondents generally have a satisfactory level of theoretical training, but they need to deepen their knowledge of the pharmacological properties, features of use, side effects and contraindications of individual groups of drugs used for the symptomatic treatment of cough, and improve practical skills in pharmaceutical care when dispensing medications to patients with cough.

CONCLUSIONS

1. Cough remains a serious clinical problem, both as a symptom of a range of other conditions such as asthma, chronic obstructive pulmonary disease, gastroesophageal reflux (GER), and as a problem in its own resulting in sleep disturbance, nausea, chest pain. Patients with chronic cough often experience social embarrassment, urinary incontinence, and low mood. There is a significant economic cost for the individual with cough and society when it leads to absence from work and lost productivity.

2. Treatment of cough, depending on its cause and type, involves the use of expectorants, mucolytics, antitussives, antihistamines, and other medications. Knowledge of the pharmacological properties, features of use, side effects, and contraindications to the use of these medications is absolutely essential for a modern pharmacist.

3. The participation of a pharmacist in the treatment process of cough allows to reduce the risk of complications, optimize therapy and provide patients with the appropriate level of medical care. That is why the role of pharmaceutical care in self-treatment of cough is extremely important and requires further development and improvement.

4. In accordance with the research objectives, we developed a questionnaire consisting of 28 questions, determined a sample of respondents, and conducted an anonymous survey using Google Forms. The survey was attended by 60 respondents - senior students of the National University of Pharmacy and the Faculty of Medicine and Pharmacy of Rabat and pharmacists from Rabat and Salé cities (Rabat-Salé-Kénitra, Morocco).

5. Based on the results of the survey, the demographic characteristics of the respondents were analyzed, namely gender, age, country of residence and occupation. The total number of survey participants was 60 people including students and pharmacists.

6. Based on the analysis of the survey results, we assessed the awareness of the surveyed audience regarding general recommendations for treating cough, the main groups of drugs used in treating cough, their mechanisms of action, range, features of use, side effects and contraindications to use, as well as issues related to pharmaceutical supervision during the dispensing of such drugs.

7. Based on the results of our study, we can conclude that respondents generally have a satisfactory level of theoretical training, but they need to deepen their knowledge of the pharmacological properties, features of use, side effects and contraindications of individual groups of drugs used for the symptomatic treatment of cough, and improve practical skills in pharmaceutical care when dispensing medications to patients with cough.

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APPENDICES

Appendix A

Questionnaire for surveying students and pharmaceutical professionals

Topic: Study of awareness of students and pharmaceutical professionals regarding the rational use of over-the-counter drugs for the treatment of cough

Dear Respondent!
We ask you to participate in an anonymous research conducted at the Department of Pharmacology and Clinical Pharmacy of the National University of Pharmacy (Ukraine) as part of the completion of a qualification thesis. The purpose of the research is to study the awareness of students and pharmaceutical professionals regarding the rational use of over-the-counter drugs in the treatment of cough. Your answers will help us to understand the level of knowledge regarding the clinical and pharmacological aspects of the rational use of over-the-counter drugs for the treatment of cough and to identify the need for additional information on this topic.

All data obtained will be used exclusively in aggregate form for scientific purposes.

1. General information

1.1. Please indicate your age, full years (one answer):
□ Under 20
□ 20-25
□ 26-30
□ 31-40
□ Over 40

1.2. Please indicate your gender (one answer):

□ Male

□ Female

1.3. Please indicate the country where you live:

_____

1.4. Please indicate your occupation (one answer):

□ Student pharmacist

□ Pharmacy professional

2. Awareness of the rational use of over-the-counter drugs for cough treatment

2.1. Name the most significant causes of cough, in your opinion (multiple answers):

□ Adverse climatic factors

□ Adverse heredity

□ Air pollution

□ Allergic reactions

□ Bronchospasm

□ Chemical irritation of the upper respiratory tract

□ Gastroesophageal reflux

□ Improper nutrition

□ Inflammation of the upper respiratory tract

□ Mechanical irritation of the upper respiratory tract

□ Obesity

□ Respiratory viral infections

□ Smoking

2.2. Name the threatening symptoms of a cough that require a visit to the doctor (multiple answers):

□ Cough is accompanied by a persistent long-term (within 2 weeks) increase in body temperature to 37.5°-38°C

□ Cough is accompanied by a short-term increase in body temperature to 37.5°-38°C

□ Cough is accompanied by attacks of shortness of breath, weakness, weight loss

□ Cough is accompanied by high (above 38°-39°C) increase in body temperature for 2 or more days

□ Cough is accompanied by profuse sweating (especially at night), fever

□ Cough is accompanied by shortness of breath, chest pain when breathing

□ Cough is accompanied by sneezing and runny nose

□ Cough is accompanied by the release of thick greenish sputum or sputum with streaks of blood

□ Cough is not accompanied by sputum discharge

□ Cough lasts more than a week and its intensity increases

□ Intense cough lasts for an hour without a break

2.3. Name the cases in which self-treatment of cough is possible (multiple answers):

□ Acute bronchitis (early stages)

□ Acute bronchitis (severe course)

□ Acute respiratory diseases

□ Chronic bronchitis

□ Emphysema

□ Inhalation of irritants (provided the patient's general condition is satisfactory)

□ Laryngitis

□ Lung cancer

□ Pneumonia

□ Tracheitis

□ Tuberculosis

2.4. Give general recommendations for treating cough (multiple answers):

□ Abstain from smoking, including passive smoking

□ Avoid airing the room

□ Drink plenty of fluids

□ Follow a diet

□ Reduce excess body weight

□ Reduce physical activity and adhere to bed rest

□ Ventilate the room more often

2.5. Specify the drugs belonging to the group of mucolytics (multiple answers):

□ Acetylcysteine

□ Ambroxol

□ Bromhexine

□ Butamirate citrate

□ Carbocysteine

□ Codeine phosphate

□ Dextromethorphan

□ Glaucine

□ Marshmallow root

□ Oxeladine

□ Potassium iodide

□ Prenoxdiazine

□ Thermopsis herb

2.6. Indicate the mechanism of action of direct-acting mucolytic agents (one answer):

□ Breaking of disulfide bonds of mucopolysaccharides of sputum, which leads to a decrease in its viscosity

□ Decreased excitability of peripheral sensory (cough) receptors

□ Increased production of serous secretion and mucociliary clearance, stimulation of surfactant synthesis and secretion

□ Inhibition of the cough center in the medulla oblongata

□ Moderate irritant effect on the receptors of the gastric mucosa, which causes a reflex increase in the secretion of bronchial glands, ciliary movement of the bronchial epithelium and peristalsis of the bronchioles

□ The release of active substances by the bronchial glands, which leads to stimulation of their secretion, liquefaction of sputum and activation of the motor function of the bronchial epithelium

2.7. Indicate the features of the use of acetylcysteine drugs (multiple answers):

□ Antibiotics should be taken 2 hours after acetylcysteine

□ Antibiotics should be taken simultaneously with acetylcysteine

□ During treatment, driving or operating machinery should be avoided

□ During treatment, it is recommended to increase fluid intake

□ Take after meals

□ Take on an empty stomach

□ Treatment should be started with maximum doses

□ Treatment should be started with small doses (100-200 mg)

2.8. List the possible side effects of acetylcysteine drugs (multiple answers):

□ Allergic reactions

□ Bronchospasm

□ CNS depression

□ Drug addiction

□ Muscle pain

□ Pulmonary hemorrhage

□ Stomach pain, nausea and vomiting

□ Tachycardia

2.9. Indicate contraindications to the use of acetylcysteine drugs (multiple answers):

□ Acute bronchitis

□ Arterial hypertension

□ Bedridden patients

□ Children under 12 years old

□ Children under 2 years old

□ Cough

□ Diabetes mellitus

□ Gastritis or stomach ulcer

□ Hemoptysis, pulmonary hemorrhage

□ Hypersensitivity to the components of the drug

2.10. Indicate the mechanism of action of ambroxol drugs (one answer):

□ Breaking of disulfide bonds of mucopolysaccharides of sputum, which leads to a decrease in its viscosity

□ Decreased excitability of peripheral sensory (cough) receptors

□ Increased production of serous secretion and mucociliary clearance, stimulation of surfactant synthesis and secretion

□ Inhibition of the cough center in the medulla oblongata

□ Moderate irritant effect on the receptors of the gastric mucosa, which causes a reflex increase in the secretion of bronchial glands, ciliary movement of the bronchial epithelium and peristalsis of the bronchioles

□ The release of active substances by the bronchial glands, which leads to stimulation of their secretion, liquefaction of sputum and activation of the motor function of the bronchial epithelium

2.11. Indicate the mechanism of action of expectorant drugs with resorptive action (one answer):

□ Breaking of disulfide bonds of mucopolysaccharides of sputum, which leads to a decrease in its viscosity

□ Decreased excitability of peripheral sensory (cough) receptors

□ Increased production of serous secretion and mucociliary clearance, stimulation of surfactant synthesis and secretion

□ Inhibition of the cough center in the medulla oblongata

□ Moderate irritant effect on the receptors of the gastric mucosa, which causes a reflex increase in the secretion of bronchial glands, ciliary movement of the bronchial epithelium and peristalsis of the bronchioles

□ The release of active substances by the bronchial glands, which leads to stimulation of their secretion, liquefaction of sputum and activation of the motor function of the bronchial epithelium

2.12. Indicate the main mechanism of action of herbal expectorants (one answer):

□ Breaking of disulfide bonds of mucopolysaccharides of sputum, which leads to a decrease in its viscosity

□ Decreased excitability of peripheral sensory (cough) receptors

□ Increased production of serous secretion and mucociliary clearance, stimulation of surfactant synthesis and secretion

□ Inhibition of the cough center in the medulla oblongata

□ Moderate irritant effect on the receptors of the gastric mucosa, which causes a reflex increase in the secretion of bronchial glands, ciliary movement of the bronchial epithelium and peristalsis of the bronchioles

□ The release of active substances by the bronchial glands, which leads to stimulation of their secretion, liquefaction of sputum and activation of the motor function of the bronchial epithelium

2.13. Specify the medicinal plant raw materials used in herbal medicines for the treatment of cough (multiple answers):

□ Buckthorn bark

□ Coltsfoot leaves

□ Elecampane rhizomes and roots

□ Ginseng roots

□ Iceland moss

□ Ivy leaves

□ Licorice root

□ Linden flowers

□ Marshmallow roots

□ Motherwort herb

□ Oregano herb

□ Plantain leaves

□ Primrose rhizomes with roots

□ Pumpkin seeds

□ Thermopsis herb

□ Thyme herb

□ Valerian rhizomes with roots

□ Violet herb

□ Wormwood herb

2.14. What medications CANNOT be combined with expectorants? (multiple answers):

□ Analgesics-antipyretics

□ Centrally acting antitussives

□ Cephalosporins

□ First-generation antihistamines

□ Glucocorticosteroids

□ Mucolytics

□ Peripheral antitussives

2.15. Indicate possible side effects when using herbal expectorants (multiple answers):

□ Allergic reactions

□ Bronchospasm

□ CNS depression

□ Drug addiction

□ Muscle pain

□ Pulmonary hemorrhage

□ Stomach pain, nausea and vomiting

□ Tachycardia

2.16. Indicate possible contraindications to the use of herbal expectorants (multiple answers):

□ Acute bronchitis

□ Arterial hypertension

□ Bedridden patients

□ Children under 12 years of age

□ Children under 2 years of age

□ Cough

□ Diabetes mellitus

□ Gastritis or stomach ulcer

□ Hemoptysis, pulmonary hemorrhage

□ Hypersensitivity to the components of the drug

2.17. Indicate the mechanism of action of centrally acting antitussive drugs (one answer):

□ Breaking of disulfide bonds of mucopolysaccharides of sputum, which leads to a decrease in its viscosity

□ Decreased excitability of peripheral sensory (cough) receptors

□ Increased production of serous secretion and mucociliary clearance, stimulation of surfactant synthesis and secretion

□ Inhibition of the cough center in the medulla oblongata

□ Moderate irritant effect on the receptors of the gastric mucosa, which causes a reflex increase in the secretion of bronchial glands, ciliary movement of the bronchial epithelium and peristalsis of the bronchioles

□ The release of active substances by the bronchial glands, which leads to stimulation of their secretion, liquefaction of sputum and activation of the motor function of the bronchial epithelium

2.18. Specify over-the-counter antitussive drugs (multiple answers):

□ Acetylcysteine

□ Ambroxol

□ Bromhexine

□ Butamirate citrate

□ Carbocysteine

□ Codeine phosphate

□ Dextromethorphan

□ Glaucine

□ Marshmallow root

□ Oxeladine

□ Potassium iodide

□ Prenoxdiazine

□ Thermopsis herb

2.19. List possible side effects of over-the-counter centrally acting antitussives (multiple answers):

□ Allergic reactions

□ CNS depression

□ Diarrhea

□ Drug addiction

□ Dry cough

□ Dry mouth

□ Low blood pressure

□ Vomiting

2.20. Indicate contraindications to the use of over-the-counter centrally acting antitussives (multiple answers):

□ Acute bronchitis

□ Arterial hypotension

□ Children under 12 years of age

□ Children under 2 years of age

□ Cough with sputum discharge

□ Diabetes mellitus

□ Dry, irritating cough

□ Gastritis or stomach ulcer

□ Hypersensitivity to the components of the drug

□ Pregnancy and breastfeeding

□ Use with drugs that affect the CNS or alcohol

Continuation app. A

2.21. Specify the dosage forms of over-the-counter medications for treating cough (multiple answers):

□ Coated tablets

□ Effervescent tablets

□ Injection solution

□ Liquid extract

□ Lozenges

□ Oral solution

□ Pastilles

□ Suppositories

□ Syrup

□ Tablets

2.22. Specify the features of the use of cough syrups (multiple answers):

□ After opening the bottle, use no longer than the period specified in the instructions, even if the expiration date has not yet expired

□ Consider the composition of excipients when used by patients with diabetes

□ Drink plenty of warm drinks during use

□ Keep out of reach of children

□ Limit fluid intake during use

□ Shake well before use

□ Use a measuring spoon for easy dosing

□ Use once a day on an empty stomach

□ Use several times a day after meals

2.23. Rate your level of knowledge on pharmaceutical care when dispensing OTC medications used to treat cough on a 5-point scale (one answer):

□ 5 points (very high level)

□ 4 points (high level)

□ 3 points (sufficient level)

□ 2 points (insufficient level)

□ 1 point (low level)

2.24. Would you like to improve your knowledge of pharmaceutical care when dispensing OTC medications used to treat cough?

□ Yes

□ No

□ Difficult to answer

Thank you for your participation!

Your answers are very important to us!

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

СЕРТИФІКАТ УЧАСНИКА

Цим засвідчується, що

Mallouki Ch.

Scientific supervisor: Ochkur O.V.

брав(ла) участь у роботі

XXXI Міжнародної науково-практичної конференції молодих вчених та студентів

«АКТУАЛЬНІ ПИТАННЯ СТВОРЕННЯ НОВИХ ЛІКАРСЬКИХ ЗАСОБІВ»

В.о. ректора
Національного фармацевтичного університету

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ * Національний фармацевтичний університет * №02010936

Алла КОТВІЦЬКА

23-25 квітня 2025 р, м. Харків

Appendix B

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

АКТУАЛЬНІ ПИТАННЯ СТВОРЕННЯ НОВИХ ЛІКАРСЬКИХ ЗАСОБІВ

МАТЕРІАЛИ
XXXI МІЖНАРОДНОЇ НАУКОВО-ПРАКТИЧНОЇ
КОНФЕРЕНЦІЇ МОЛОДИХ ВЧЕНИХ ТА СТУДЕНТІВ

23–25 квітня 2025 року
м. Харків

Харків
НФаУ
2025

Continuation app. B

УДК 615.1

Редакційна колегія: проф. Котвіцька А. А., проф. Владимирова І. М.
Укладачі: Сурікова І. О., Боднар Л. А., Комісаренко М. А., Комісарова Є. Є.

Актуальні питання створення нових лікарських засобів: матеріали XXXI міжнародної науково-практичної конференції молодих вчених та студентів (23-25 квітня 2025 р., м. Харків). – Харків: НФаУ, 2024. – 515 с.

Збірка містить матеріали міжнародної науково-практичної конференції молодих вчених та студентів «Актуальні питання створення нових лікарських засобів, які представлені за пріоритетними напрямами науково-дослідної роботи Національного фармацевтичного університету. Розглянуто теоретичні та практичні аспекти синтезу біологічно активних сполук і створення на їх основі лікарських субстанцій; стандартизації ліків, фармацевтичного та хіміко-технологічного аналізу; вивчення рослинної сировини та створення фітопрепаратів; сучасної технології ліків та екстемпоральної рецептури; біотехнології у фармації; досягнень сучасної фармацевтичної мікробіології та імунології; доклінічних досліджень нових лікарських засобів; фармацевтичної опіки рецептурних та безрецептурних лікарських препаратів; доказової медицини; сучасної фармакотерапії, соціально-економічних досліджень у фармації, маркетингового менеджменту та фармакоекономіки на етапах створення, реалізації та використання лікарських засобів; управління якістю у галузі створення, виробництва й обігу лікарських засобів; суспільствознавства; фундаментальних та мовних наук.

УДК 615.1

did not show a statistically significant difference between the IPL-treated area and the control area (p=0.758, p=0.923, p=0.342, respectively). After completion of therapy, according to the GIS assessment, a statistically significant improvement in all these parameters was recorded (all p<0.001). Among the IPL-treated areas, 60.9% of patients reported satisfaction with the treatment results, and 30.4% reported a high level of satisfaction. In the control areas, 73.9% of participants said they were not satisfied with the result, while 21.7% rated the effect as moderately satisfactory. No side effects, such as burning, erosion, post-inflammatory pigmentation, or scarring, were observed in any participant after the sessions. According to the study authors, the findings confirm both the efficacy and safety of IPL therapy, which allows it to be considered as a potential first-line treatment for KP.

In July 2019, the Department of Dermatology, Venereology and Andrology, Faculty of Medicine, Alexandria University, Egypt, conducted a study of the efficacy, safety and tolerability of CO_2 laser therapy in the treatment of KP. The comparative study involved 60 patients with bilateral lesions of the arms (group A) and thighs (group B). All patients were female, mean age was 19.7±2.2 years (range: 18-25 years). Forty-two patients (70%) were of skin phototype III, and 18 patients (30%) were of skin type IV. One side of the lesion was randomly exposed to fractional CO_2 laser exposure (parameters: power 12 W, pulse duration 3 ms, PPI 5), which was performed twice with a four-week interval. The opposite side served as a control area and was treated with a topical keratolytic agent with 10% urea. At each visit, the results were recorded using standardized clinical and dermoscopic digital photographs.

In group A, excellent improvement was noted in 10 patients (33.3%), good improvement in 18 patients (60%), and moderate improvement in 2 patients (6.7%) at the second visit. In group B, minimal improvement was noted in 2 (6.7%) patients, moderate improvement in 16 patients (53.3%), and good improvement in 12 patients (40%) at the second follow-up. At all control points after treatment, there was a significantly pronounced improvement in skin condition in both groups compared to the areas treated with topical agents alone. The level of patient satisfaction was also statistically higher after laser therapy. At the same time, the effectiveness of treatment of skin lesions on the arms was significantly higher than on the thighs (p<0.001). No side effects were recorded in any of the groups.

It has been demonstrated that serial sessions of fractional CO2 laser are an effective, safe and tolerable method of treating KP on Egyptian-type skin.

Conclusions. Comparing these hardware-based cosmetic methods of treating keratosis, we can conclude that they are effective, safe, and have a long-lasting result. It should be noted that it is worth combining hardware methods with topical preparations, because these methods cannot be the first-line of treatment.

CLINICAL AND PHARMACOLOGICAL ASPECTS OF THE RATIONAL USE OF OTC DRUGS FOR THE TREATMENT OF COUGH

Mallouki Ch.
Scientific supervisor: Ochkur O.V.
National University of Pharmacy, Kharkiv, Ukraine
alex.o4kur@gmail.com

Introduction. Cough consists of three phases (inhalation, contraction, and exhalation) and serves as a vital defense mechanism for lung health. It prevents pulmonary aspiration, promotes ciliary activity, and clears airway obstruction. The importance of an intact cough mechanism is reflected in the occurrence of lung problems when coughing is ineffective. Cough remains a serious

clinical problem, both as a symptom of a range of other conditions such as asthma, chronic obstructive pulmonary disease, gastroesophageal reflux, and as a problem in its own right in patients with chronic cough of unknown origin. Therefore, understanding the clinical and pharmacological aspects of the rational use of over-the-counter (OTC) cough medications is absolutely essential for the modern pharmaceutical professional.

Aim. Research on the range of OTC medicines used in the treatment of cough and presented on the pharmaceutical market; development of questionnaires for surveying pharmaceutical workers and senior students of specialty 226 Pharmacy and Industrial Pharmacy of the National University of Pharmacy regarding their awareness of the rational use of these medicines; conducting anonymous questionnaires among the specified contingents; analysis of the respondents' answers.

Materials and methods. To achieve the research goal, the following methods were used in the work: bibliosemantic analysis of scientific literature, sociological survey (questionnaire), statistical processing of results, system analysis.

Results and discussion. Based on the results of the analysis of data from open information sources, we conducted a study of the range of OTC drugs used in the treatment of cough, created a questionnaire that included questions about the nomenclature, pharmacological properties, side effects, features of use and pharmaceutical care when dispensing antitussive, expectorant, mucolytic and other drugs used in the treatment of this symptom, and conducted a survey of respondents.

Conclusions. The results of the study allowed us to assess the level of awareness of pharmaceutical workers and students regarding the clinical and pharmacological aspects of the rational use of OTC drugs for the treatment of cough.

RESEARCH INTO THE PHARMACIST'S ROLE IN ACHIEVING "ASTHMA CONTROL"

Najla Grine
Scientific supervisor: Zhabotynska N.V.
National University of Pharmacy, Kharkiv, Ukraine
najlagrine1909@gmail.com

Introduction. Bronchial asthma (BA) is a globally significant non-communicable disease with major public health consequences, including high morbidity, and mortality in severe cases. Today, BA pharmacotherapy is carried out by family physicians on an outpatient basis or by pulmonologists in hospitals; however, pharmacists can also make a useful contribution to achieving "asthma control" due to their knowledge of pharmacology and clinical pharmacology of drugs and frequent contact with the patient when patients receive prescription medications. Studying the practical implementation of the pharmacist's role in achieving "asthma control" will allow identifying problematic issues and suggesting ways to solve them.

Aim. The purpose of the research was to study pharmacist's role in achieving "asthma control".

Materials and methods. To achieve the research purpose, a questionnaire was developed, consisting of 4 parts and 22 questions. The survey was attended by 29 pharmacists aged 21 to 41 years; 10 female (34,48%) and 19 male (65,52%). Among the respondents, 12 (41,38%) are full-time pharmacist, including 7 (58,33%) are 5th year students of the National University of Pharmacy. Statistical methods were used to analyze the results obtained.

Continuation app. B

СЕКЦІЯ 8. ФАРМАКОЛОГІЯ, ФАРМАКОТЕРАПІЯ, КЛІНІЧНА ФАРМАЦІЯ ТА КЛІНІЧНА КОСМЕТОЛОГІЯ
PHARMACOLOGY, PHARMACOTHERAPY, CLINICAL PHARMACY AND CLINICAL COSMETOLOGY

Ф А 2.2.1-32-366

National University of Pharmacy

Faculty pharmaceutical
Department pharmacology and clinical pharmacy
Level of higher education master
Specialty 226 Pharmacy, industrial pharmacy
Educational and professional program Pharmacy

APPROVED
The Head of Department
pharmacology and clinical pharmacy

_____
Sergii SHTRYGOL
«02» September 2024

ASSIGNMENT
FOR QUALIFICATION WORK
OF AN APPLICANT FOR HIGHER EDUCATION

Chadi MALLOUKI

1. Topic of qualification work: «Clinical and pharmacological aspects of the rational use of OTC drugs for the treatment of cough»
supervisor of qualification work: Oleksandr OCHKUR, cand. of pharm. sc., assoc. prof.
approved by order of NUPh from «27» of September 2024 № 237

2. Deadline for submission of qualification work by the applicant for higher education: May 2025

3. Outgoing data for qualification work: research on the awareness of higher education students and pharmacists regarding the clinical and pharmacological aspects of the rational use of over-the-counter drugs for the symptomatic treatment of cough.

4. Contents of the settlement and explanatory note (list of questions that need to be developed): to conduct a review of the scientific literature on the causes and pathogenetic basis of cough, approaches to symptomatic treatment of its main forms, as well as the main groups of drugs used to treat this symptom; to develop a questionnaire for surveying pharmaceutical specialists and senior students regarding their awareness of the clinical and pharmacological aspects of the rational use of drugs for the symptomatic treatment of cough; to conduct an anonymous survey among respondents and analyze their responses.

5. List of graphic material (with exact indication of the required drawings):
tables – 2, figures – 28

6. Consultants of chapters of qualification work

Chapters	Name, SURNAME, position of consultant	Signature, date	
		assignment was issued	assignment was received
1	Oleksandr OCHKUR, associate professor of higher education institution of department of pharmacology and clinical pharmacy	02.09.2024	02.09.2024
2	Oleksandr OCHKUR, associate professor of higher education institution of department of pharmacology and clinical pharmacy	08.01.2025	08.01.2025
3	Oleksandr OCHKUR, associate professor of higher education institution of department of pharmacology and clinical pharmacy	08.01.2025	08.01.2025

7. Date of issue of the assignment: «02» September 2024.

CALENDAR PLAN

No.	Name of stages of qualification work	The term of performance of qualification work stages	Notes
1	Analysis of scientific sources on the topic of the work	September – December 2024	**done**
2	Carrying out own research	January – April 2025	**done**
3	Preparation of work and submission to the Examination commission	April - May 2025	**done**

Applicant of higher education _____ Chadi MALLOUKI

Supervisor of qualification work _____ Oleksandr OCHKUR

ВИТЯГ З НАКАЗУ № 237

По Національному фармацевтичному університету

від 27 вересня 2024 року

Затвердити теми кваліфікаційних робіт здобувачам вищої освіти 5-го курсу Фм20(4,10д) 2024-2025 навчального року, освітньо-професійної програми – Фармація, другого (магістерського) рівня вищої освіти, спеціальності 226 – Фармація, промислова фармація, галузь знань 22 Охорона здоров'я, денна форма здобуття освіти (термін навчання 4 роки 10 місяців), які навчаються за контрактом (мова навчання англійська та українська) згідно з додатком № 1.

Прізвище, ім'я здобувача вищої освіти	Тема кваліфікаційної роботи		Посада, прізвище та ініціали керівника	Рецензент кваліфікаційної роботи
по кафедрі фармакології та клінічної фармації				
Маллукі Шаді	Клініко-фармакологічні аспекти раціонального використання безрецептурних препаратів для лікування кашлю	Clinical and pharmacological aspects of the rational use of OTC drugs for the treatment of cough	доцент Очкур О.В.	доцент Кононенко А.Г.

Ректор

Вірно. Секретар

ФА2.8-03-317

ВИСНОВОК

експертної комісії про проведену експертизу
щодо академічного плагіату у кваліфікаційній роботі

здобувача вищої освіти

«05» травня 2025 р. № 331123351

Проаналізувавши кваліфікаційну роботу здобувача вищої освіти Маллукі Шаді, групи Фм20(4,10)англ-02, спеціальності 226 Фармація, промислова фармація, освітньої програми «Фармація» навчання на тему: «Клініко-фармакологічні аспекти раціонального використання безрецептурних препаратів для лікування кашлю / Clinical and pharmacological aspects of the rational use of drugs for the symptomatic treatment of allergies», 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 supervisor for the qualification work of the master's level of higher education of the specialty 226 Pharmacy, industrial pharmacy

Chadi MALLOUKI

on the topic: «Clinical and pharmacological aspects of the rational use of OTC drugs for the treatment of cough».

Relevance of the topic. Cough is associated with a significant deterioration in the quality of life, regardless of whether it is acute or chronic. Cough leads to significant economic costs for the individual and society through disability and loss of productivity. Therefore, understanding the clinical and pharmacological aspects of the rational use of OTC drugs for the treatment of cough is absolutely necessary for the modern pharmaceutical specialist.

Practical value of conclusions, recommendations and their validity. A questionnaire was developed, a survey of senior higher education students and pharmacists in Rabat (Morocco) was conducted on the clinical and pharmacological aspects of the rational use of drugs used in the symptomatic treatment of cough, and the obtained data were analyzed. The results of the study can be used in the educational process.

Assessment of the work. The material of the qualification work is presented methodically, correctly, consistently, logically, which indicates the author's ability to analyze scientific primary sources, summarize literary and experimental data.

General conclusion and recommendations on admission to defense. The obtained research results in terms of relevance, scientific level and practical significance meet the requirements for qualification works, therefore the presented work can be recommended for public defense to the Examination commission of the National University of Pharmacy.

Supervisor _____ Oleksandr OCHKUR

«12» May 2025

Ф А 2.2.1-32-356

REVIEW

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

Chadi MALLOUKI

on the topic: «Clinical and pharmacological aspects of the rational use of OTC drugs for the treatment of cough».

Relevance of the topic. Cough is a serious clinical problem, both as a symptom of a number of diseases, such as asthma, chronic obstructive pulmonary disease, gastroesophageal reflux, and as an independent problem in patients with chronic cough of unknown origin. Therefore, understanding the clinical and pharmacological aspects of the rational use of over-the-counter cough medications is absolutely necessary for the modern pharmaceutical specialist.

Theoretical level of the work. The higher education applicant has processed a large amount of scientific literature at a sufficiently high theoretical level. The content of the work fully corresponds to the tasks set. 1 report theses have been published on the topic of the work.

Author's suggestions on the research topic. The applicant conducted a review of the scientific literature on the causes and pathogenetic basis of cough, approaches to symptomatic treatment of its main forms, as well as the main groups of over-the-counter drugs used to treat this symptom; developed a questionnaire for surveying pharmacists and senior students regarding their awareness of the clinical and pharmacological aspects of the rational use of drugs for symptomatic treatment of cough; conducted an anonymous survey of respondents and analyzed their responses.

Practical value of conclusions, recommendations and their validity. The results of the study indicated the need to improve the practical skills of applicants in providing pharmaceutical care in the symptomatic treatment of cough and to deepen their knowledge about the mechanisms of action, pharmacological properties, side

effects and contraindications to the use of relevant groups of drugs. The results of the study can be used in the educational process in the training of future pharmacists and in improving the qualifications of pharmaceutical specialists.

Disadvantages of the work. Among the shortcomings, inaccurate statements that do not affect the scientific and practical value of the work can be noted.

General conclusion and assessment of the work. The material of the qualification work is presented consistently and systematically, which indicates the author's ability to apply selective analysis of scientific primary sources and experimental data and critically summarize them. The qualification work meets all requirements and can be submitted for defense to the Examination commission of the National University of Pharmacy.

Reviewer _____ assoc. prof. Alevtina KONONENKO

«14» May 2025

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ
ВИТЯГ З ПРОТОКОЛУ № 19
засідання кафедри фармакології та клінічної фармації

15 травня 2025 р. м. Харків

Голова: завідувач кафедри, доктор мед. наук, професор Штриголь С. Ю.
Секретар: кандидат фарм. наук, доцент Вєтрова К. В.

ПРИСУТНІ: зав. каф., проф. Штриголь С.Ю., проф. Деримедвідь Л.В., доц. Бєлік Г.В., доц. Вєтрова К.В., доц. Жаботинська Н.В., доц. Кононенко А. В., доц. Матвійчук А.В., доц. Отрішко І.А., доц. Очкур О.В., доц. Рябова О.О., доц. Савохіна М.В., доц. Степанова С. І., доц. Таран А.В., ас. Верховодова Ю.В., ас. Підгайна В.В. та здобувачі вищої освіти.

ПОРЯДОК ДЕННИЙ:
1. Розгляд кваліфікаційних робіт здобувачів вищої освіти для подання робіт до Екзаменаційної комісії.

СЛУХАЛИ:
1.- Здобувача вищої освіти Маллукі Шаді зі звітом про проведену наукову діяльність за темою кваліфікаційної роботи: «Клініко-фармакологічні аспекти раціонального використання безрецептурних препаратів для лікування кашлю» («Clinical and pharmacological aspects of the rational use of OTC drugs for the treatment of cough»).

УХВАЛИЛИ:
1. Кваліфікаційну роботу розглянуто. Здобувач вищої освіти Маллукі Шаді допускається до захисту даної кваліфікаційної роботи в Екзаменаційній комісії.

Голова
Завідувач кафедри, проф. _____ Штриголь С. Ю.

Секретар, доц. _____ Вєтрова К. В.

Ф А2.2.1-32-042

НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

ПОДАННЯ
ГОЛОВІ ЕКЗАМЕНАЦІЙНОЇ КОМІСІЇ
ЩОДО ЗАХИСТУ КВАЛІФІКАЦІЙНОЇ РОБОТИ

Направляється здобувач вищої освіти Шаді МАЛЛУКІ до захисту кваліфікаційної роботи
за галуззю знань 22 Охорона здоров'я
спеціальністю 226 Фармація, промислова фармація
освітньою-професійною програмою Фармація
на тему: «Клініко-фармакологічні аспекти раціонального використання безрецептурних препаратів для лікування кашлю»

Кваліфікаційна робота і рецензія додаються.

Декан факультету _____ / Микола ГОЛІК /

Висновок керівника кваліфікаційної роботи

Здобувач вищої освіти Шаді МАЛЛУКІ успішно виконав поставлені завдання, засвоїв роботу з науковими першоджерелами та методики, які він застосовував у своєму дослідженні. Отримані результати досліджень за актуальністю, науковим та практичним значенням відповідають вимогам, які висуваються до кваліфікаційних робіт, тому представлена робота може бути рекомендована до публічного захисту у Екзаменаційну комісію Національного фармацевтичного університету.

Керівник кваліфікаційної роботи

_____ Олександр ОЧКУР

«12» травня 2025 р.

Висновок кафедри про кваліфікаційну роботу

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

Завідувач кафедри
фармакології та клінічної фармації

_____ Сергій ШТРИГОЛЬ

«15» травня 2025 року

Qualification work was defended

of Examination commission on

«___» of June 2025

With the grade _____

Head of the Examination commission,

D.Pharm.Sc, Professor

_____ /Volodymyr YAKOVENKO/