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QUALIFICATION WORK

on the topic: **«DEVELOPMENT OF THE COMPOSITION OF SEDATIVE TABLETS»**

Prepared by: higher education graduate of
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ANNOTATION

Research on the composition of sedative tablet manufacture is the main topic of the qualifying work. The development potential of solid sedative medications was the subject of a literature review. Numerous sedative drugs have been investigated. It was examined how additional chemicals affected the technical properties of tableted masses and the quality markers of the resulting tableted mixes. An appropriate method has been devised for the production of tablets containing dry extracts of lavender and motherwort.

The qualification work is 41 pages long and includes an introduction, three chapters, general findings, a list of the sources utilized, and appendices. The article is illustrated with six figures and six tables and contains thirty references to scholarly literature.

Key words: dry extracts of motherwort and lavender, tablets, technology of pharmaceutical preparations, sedative effect.

АНОТАЦІЯ

Розробка складу таблеток седативної дії є основною темою кваліфікаційної роботи. Потенціал розвитку твердих седативних лікарських засобів був предметом літературного огляду. Були досліджені численні заспокійливі препарати. Вивчено, як додаткові хімічні речовини впливають на технічні властивості таблетованих мас та маркери якості отриманих таблетованих сумішей. Розроблено відповідний спосіб виробництва таблеток, що містять сухі екстракти лаванди та пустирника.

Робота складається зі вступу, трьох розділів, загальних висновків, списку використаних джерел та додатків на 41 сторінці. Робота ілюстрована шістьма рисунками і шістьма таблицями та містить тридцять посилань на наукову літературу.

Ключові слова: сухі екстракти пустирника та лаванди, таблетки, технологія фармацевтичних засобів, заспокійлива дія.

CONTENT

INTRODUCTION

Relevance of the research topic. Globally, there is growing worry about the population's mental health issues. World Health Organization (WHO) research in certain nations indicates that while neurotic disorders (neuroses) affect a large portion of the population, the great majority of cases go misdiagnosed and untreated.

Psychotropic medications, such as sedatives, anxiolytics, and antidepressants, are frequently ineffective in treating neuropsychiatric illnesses. Their safety and tolerability are therefore given particular consideration. Interest in herbal medicines has increased as a result of the scientific community's quest for safe and effective psychotropic medications.

The purpose the creation of sedative-effect tablet technology and composition based on science is part of the qualification job.

The object of research is dry extracts of lavender and motherwort.

Complex physico-chemical and technological research, as well as the development of the ideal solid dosage form composition, were the research methodologies employed in this work.

The practical significance of the results. Throughout the project, the tablets' logical composition was confirmed. Tablet technology is a developed technology.

Approbation of research and publication results. The qualification work was tested at the «Current issues of creating new medicines: materials of the XXXI international scientific and practical conference of young scientists and students» (April 23-25, 2025, Kharkiv). - Kharkiv: NUPh, 2025. Published abstracts: Zakaria Anass. Development of the composition of sedative tablets. Modern achievements of pharmaceutical business: collection of scientific works, issue 1. – Kharkiv, NUPh publishing house, 2025. P.150.

Structure and scope of qualification work the 41-page qualification work includes an introduction, three chapters, conclusions, and a list of the 30 references that were studied. Six tables and six figures are used to show the work.

CHAPTER 1
ASPECTS OF CREATION OF SEDATIVE TABLETS

1.1. The way somatoform illnesses are categorized.

One of the most significant medical and social issues in developed nations is neurotic illnesses, or neuroses. Neurotic illnesses, such as depression and unsettling syndrome, affect 10–20% of people worldwide. Over 30% of people will experience anxiety problems at some point in their lives [6]. The formation of neurosis is known to be initiated by prolonged stress, particularly of a psychosocial kind.

Depression is most common in people with cardiovascular illness, and its prevalence rises to 22–33% when somatic pathology is present in the human body [3]. Additionally, Ukraine observes a steady rise in the incidence and mortality from severe complications of hypertension, the majority of which occur in patients with mild to moderate hypertension, even with the use of very effective antihypertensive medications in series as a monotherapy and consisting of combined therapy.

The strongest correlation between the status of the internal organs and the psyche makes it the most excellent indicator of psychosomatic pain and provides evidence of the inadequate psychophysiological regulation in hypertensive patients.

There is a unique set of patients with a range of, frequently multiple, complaints who are seen by therapists and hospitalized patients in the therapeutic department. These individuals cannot be objectively examined again to identify changes in their internal organs. A diagnosis, differential diagnosis, and, of course, therapeutic issues are the end result. Physicians who provide ambulatory polyclinic services and internists who typically treat "difficult" patients are more acutely affected by this. Clinical symptom characteristics, the patients' psycho-emotional state, and their behavioral reactions, in addition to the unfavorable findings of the

objective test, enable suspicion of the psychogenic nature of the illnesses that are currently present in these patients [5, 20].

The symptoms that resemble a number of internal organ diseases and are classified as somatoform disorders (SFD) in contemporary classifications are the most common reason to consult a therapist. Under SFD, conditions that seem as "somatic" or pseudo-somatic complaints while actually being mental diseases that are concealed by "somatic" symptoms and that neither the patient nor the physician "notice" should be understood. The fundamental characteristic of these states is the exact source of physical symptoms resulting from mental illnesses, even though the psychological aspects of these illnesses are yet unknown.

SFD merged with stress and neurotic disorders into a single group. Clinically, SFD can manifest as autonomic dysfunctions, different cenestopathies and pain syndromes The most significant vegetative dysfunctional disorders of the gastrointestinal, respiratory, cardiovascular, and urogenital systems are among the latter [1, 12]

Frequent, many, clinically important somatic problems that manifest dramatically and usually appear before the age of thirty are common indicators of neurotic somatoform disorders. When symptoms have persisted for at least two years, people frequently seek assistance from a variety of medical specialists and undergo thorough surveys, including invasive ones. No recognized medical disease can account for these problems, and patients frequently report a lack of trust in medicine along with social or familial disadaptation.

Patients with anxiety symptoms are a typical component of all neurotic somatoform illnesses, along with signs of autonomic dysfunction of variable degree. Many of these anxiety disorders, including specific phobia, social phobia, and agoraphobia, as well as the autonomic symptoms that go along with them, are situationally induced, meaning that patients attempt to avoid the situations that are causing them. Frequently, anxiety symptoms coexist with signs of sadness (mixed anxiety-depressive condition) [2, 15]

In somatoform illnesses, somatic symptoms can manifest as a variety of complaints or as a single symptom. Cardiovascular symptoms like cold fingers, Raynaud's syndrome, and vertigo; pulmonary conditions like hyperventilation syndrome; gastrointestinal issues; rheumatologic conditions; urogenital issues like dysuria, irritable bladder, and sexual dysfunction; and other symptoms like headaches, exhaustion, low-grade fever, and neutropenia are among the main manifestations that impact different organs and systems.

The primary challenge in diagnosing somatoform disorders (SFD) lies in interpreting cardiovascular symptoms, terms widely used in our country. The main cardiovascular manifestations include cardio-syndrome, rhythm disturbances (commonly arrhythmias), and "vascular dysfunction" presenting as Raynaud's syndrome, lightheadedness, and related symptoms. These are frequently preceded by anxiety-hypochondriacal phobic symptoms, which stem from underlying mental and affective disorders [3, 8]

One of the criteria for diagnosing psychogenic origin in patients with symptoms may be the existence of anxiety or panic symptoms, as well as the characterization of the patient's personality. Hypochondriacal character breaches can sometimes be made worse to the point of expressed worry, panic, or fear of death as part of the called panic attacks.

Panic disorders (PD). The most evident and severe example of autonomic dysfunction resulting in psychosocial maladjustment is seen in individuals with PD who suffer from so-called panic attacks. Regarding portability symptoms, which inevitably include feelings of worry and panic, the expectation of recurrent episodes, and improvement regarding this psychosocial maladjustment, these situations present the patient with the greatest obstacles. Patients say that many issues, including pain, irregular heartbeat, dyspnea, etc., are presented in a dramatic, figurative way with significant emotional coloring when they are questioned. Given that these patients are dedicated and actively seeking medical attention to a variety of studies, they have a "wealth of experience" to communicate with physicians of many disciplines [4, 10].

As a result, patients get reliant on ongoing diagnostic testing and regularly shifting prescribed drugs. results in a situation that can be described as follows: numerous medical specialists, numerous complaints, numerous diagnoses, and numerous prescriptions.

Patients frequently turn to the difficulties of "first aid" when they are uncomfortable, anxious, and-most importantly-convinced of the gravity of their ailment. Many times, and not without cause, patients are admitted to the hospital because it is difficult for them to clearly evaluate clinical symptoms, make a diagnosis, and choose the best course of treatment. There are still issues with diagnosis and treatment in inpatient settings [5, 18].

It must uncover evidence, even if in most situations, a doctor's initial examination can convey the impression of so-called functional problems. In order to accomplish this, you must first make an exception for conditions like coronary heart disease, gastrointestinal disorders, and other organs and systems that have a particular morphological substrate (also known as "organic diseases"). The fact that "functional" illnesses do not rule out organic pathology adds to the challenges of diagnosis and treatment.

Mitral valve prolapse (MVP) occurs in 50–65% of PD patients, compared to 5% of the general population. The neurotic nature of the symptom complex is not excluded by the existence of auscultation in these patients. In this instance, it has been proposed that alcoholism is a secondary symptom of anxiety disorders, meaning that individuals utilize alcohol as an "antianxiety" strategy [4, 19].

Numerous surveys, frequently completed by patients, along with treatment failure, strengthen their perception of the severity of their ailment, foster a negative attitude toward specific medical professionals, and undermine confidence in medicine as a whole. A patient's hypochondriacal condition, search for multiple medical specialists, and social exclusion are all quite understandable if we take into account that inadequate psychotherapy, or even disregard or even disdain for it, fails to explain the characteristics of symptoms that are persistent or recurring.

Respiratory symptomatology. The so-called hyperventilation syndrome, which is characterized by a variety of clinical symptoms as well as a compromised breathing rhythm due to insufficient ventilation metabolism, is among the most common and clinically significant signs of bronchopulmonary autonomic dysfunction. Alveolar and arterial hypocapnia is the primary pathogenetic mechanism expression of hyperventilation syndrome; nevertheless, it does not always result in symptoms, as evidenced by the inadequate adaptation and individual susceptibility to persistent hypocapnia [7, 24].

Altered breathing pattern in the form of poor ventilation metabolism, along with a range of clinical symptoms, are the most prevalent and clinically relevant indications signs of the bronchopulmonary system's autonomic dysfunction.

Alveolar and arterial hypocapnia is the primary pathogenetic mechanism expression of hyperventilation syndrome (HS), albeit it does not always result in symptoms, as evidenced by the inadequate adaptation and individual sensitivity to persistent hypocapnia [2, 14].

Respiratory discomfort is the primary clinical manifestation of HS. Due to tight clothing, these feelings are typically worse in stuffy environments. These patients are inherently less tolerant of a stuffy environment. characterized by frequent yawning and moaning, and are praised by the patients or those around them [6, 25].

A persistent need to inhale deeply causes hypocapnia, which manifests as lightheadedness, abrupt weakness, fainting, and even convulsions. Auscultation patients may unintentionally exhibit similar symptoms, particularly if the physician understates and fails to consider the likelihood that the patient has HS.

Simultaneously, during the clinical examination, physicians employ a straightforward provocative test with hyperventilation, asking the patient to take a few rapid, deep breaths. The patient then reports the emergence of the aforementioned symptoms. usually in people who are suspected of having cardiovascular illness or pulmonary disease, which involves performing pointless

and unhelpful surveys. In most cases, the suggested medication (bronchodilators, nitrates, etc.) is unsuccessful [9, 21].

In addition to other signs of autonomic dysfunction, respiratory illnesses are frequently accompanied with cardiac symptoms, anxiety, and terror. These symptoms can significantly exacerbate anxiety and phobic symptoms by leading the patient to believe that there is a serious illness.

Gastroenterological symptomatology. The most prevalent gastrointestinal tract manifestation of SFD is psychogenic abdominal pain. One of the main arguments in support of the psychogenic character of stomach pain is the link between the emergence of abdominal symptoms and the status of the psychic domain, life events, and flow dynamics.

Patients usually spend months or years trying to identify the organic basis of their illness, and it frequently appears odd that pain will emerge in relation to sociopsychological causes. The existence of additional co-permanent or paroxysmal autonomic dysfunctional symptoms is a characteristic of psychogenic stomach discomfort. Abdominal pain may be the initial symptom or develop at the height of the autonomic crisis, frequently accompanied by increased intestinal peristalsis. Abdominalgia is frequently one of the symptoms of autonomic crisis [8, 30].

When combined with other symptoms (diarrhea, vomiting, nausea, headaches, migraine pain, cold extremities, and albication), the diffuse nature, intensity, and location of the pain can sometimes be used to diagnose abdominalgia, a type of migraine that can last anywhere from one hour to several hours or even days.

The two primary SFD symptoms seen in gastroenterological practice are irritable bowel syndrome (IBS), syndrome non-ulcer dyspepsia (SNUD) [10, 27].

While a peptic ulcer, persistent gastritis, or stomach tumor lesions can be confirmed without endoscopic investigation, internists are familiar with patients who have a variety of complaints, including pain, dyspepsia and heartburn. Drugs including antacids, H2 blockers, and antispasmodics are typically useless when

prescribed in these circumstances. does not resolve issues related to diagnosis and treatment; instead, it refers patients to gastroenterologists for advice.

SNUD is characterized by recurrent episodes of nausea, discomfort, or abdominal pain that endure for at least a month, are unrelated to physical activity, and do not go away after five minutes of rest. After a meal, dyspepsia patients typically experience pain in the epigastric area along with a feeling of heaviness, pressure, and overflow. They may also belch food or air, have an unpleasant metallic taste in their mouth, and occasionally lose their appetite. Patients typically have increased intestinal motility, transfusion, and rumbling as well. Patients have diarrhea more often than constipation. The general social activity of patients is not severely affected by such disorders, despite the fact that they are disturbed patients who suffer greatly from autonomic and asthenic dysfunction [15, 23].

In addition to autonomic dysfunction symptoms as cardialgia, arrhythmia, and hyperventilation syndrome, patients frequently show signs of worry and depression upon close clinical evaluation. Somatoform neurotic disorders (SNUD) are classified into ulcer-like, reflux-like, and dyspeptic variations based on the primary symptoms.

The ulcer-like variation peptic ulcer disease most closely resembles the ulcer-like variety, which is distinguished by poor response to antacid medications and epigastric pain that is linked to meal intake, frequently at night.

Epigastric discomfort beneath the breastbone and frequent heartburn are symptoms of the reflux-like variety, which necessitates ruling out gastroesophageal reflux disease [18, 30].

The symptoms of the dyspeptic variety include bloating, belching, nausea, poor meal tolerance, and intestinal functioning problems.

The absence of radiographic and endoscopic evidence of ulcerative and stomach and esophageal tumors is the primary basis for the diagnosis of non-ulcer dyspepsia, which is an exclusionary diagnostic. Patients with other clinical and laboratory symptoms that do not fall under the umbrella of non-ulcer dyspepsia syndrome need extra attention and thorough research [21, 29].

IBS, which mostly presents as constipation, diarrhea, and pain syndrome, is another gastroenterological presentation of SFD with autonomic dysfunction. The most prevalent diagnosis is still chronic colitis, also known as spastic colitis, which "confirms" the findings from radiological studies of the colon's spastic state using radiopaque studies. In the absence of organic alterations in the gastrointestinal tract that could account for the current disorders, IBS is characterized by stomach pain coupled with a disorder of bowel function (constipation, diarrhea) that does not interfere with hunger or weight loss. The disorder lasts for at least three months [1, 18].

Acute spasmodic pain, widespread dull pain, and paroxysms of abdominal pain are only a few of the symptoms that define pain syndrome. Episodes of pain might last anywhere from a few minutes to several hours. In more than half of IBS patients, the psychic realm changes in the form of anxiety and depression problems.

Rational psychotherapy that focuses on helping patients understand how their symptoms relate to psychogenic causes and the potential for their correction should be the first line of treatment for individuals with SFD who also have autonomic dysfunction. The patient must describe in plain language the main causes of his symptoms, the good prognosis despite the intensity of his perception and tolerance, the value of working with the doctor, and his willingness to attend all of his visits. Drug therapy is the most economical and successful treatment option for these people, but it must be used in conjunction with drug-free techniques [6, 25].

Considering the negative consequences of hospitalization, the majority of patient treatment, including medication, should be done as outpatients. On the psychiatrist's advice, the internist or general practitioner should administer the treatment. In order to do this, the internist and psychiatrist must work together and have a positive relationship. They must also debate each scenario together and decide on a medication while considering the prevailing syndrome into consideration. In addition to evaluating the efficacy of prescription medications

and, if required, adjusting or replacing dosages, the attending physician must also closely monitor tolerability and promptly identify any adverse effects.

In the past, motherwort and lavender have been the preferred medications for treating neurotic disorders, which are typically of mild severity.

Pathogenetic pathways and particular symptoms, including anxiety, sadness, coenaesthopathia, and autonomic dysfunction, are the focus of pharmacotherapy for somatoform disorders (SFD). Anxiolytics, sedatives, antidepressants, cardiovascular, metabolic, and vegetotropic drugs are among the classes of pharmaceuticals used in treatment. Beta-blockers, alpha-blockers, Belloidum, and other vegetotropics; cardiovascular medications like vinpocetine and pentoxifylline; metabolic agents like piracetam and cerebrolysin; small neuroleptics like sulpiride and thioridazine; traditional benzodiazepines like diazepam, phenazepam, and tofisopam; high-potency benzodiazepines like alprazolam; tricyclic antidepressants like amitriptyline; and serotonin reuptake inhibitors like tianeptine are among them [8, 30].

Benzodiazepines are often recommended medications for the treatment of anxiety disorders. Distinguish between high-potential benzodiazepines and classical benzodiazepines. Because of its potent anti-anxiety and soothing properties, benzodiazepines are used to prevent panic episodes and sleep disruptions. Amidst the decrease in anxiety and phobic symptoms, there is a waning of autonomic dysfunction symptoms, including hyperventilation syndrome, arrhythmia, and cardiac pain.

It is recommended that medications be taken in small amounts, then gradually reduced, and if need, discontinued. Although there appears to be little chance of reliance for people using benzodiazepines, it is generally not advised to use them for longer than one to two months. For patients with anxiety and depression, benzodiazepines may be prescribed in addition to antidepressants [7, 18].

Antidepressants, tricyclic and serotonin reuptake inhibitors are examples of antidepressants, are prescribed for depressive disorders. Significant adverse effects,

such as dry mouth, constipation, and urine retention, can result from tricyclic antidepressants. Tianeptine is the antidepressant that general practitioners, especially internists, use the most because of its effectiveness and safety. The drug has tranquilizing, antidepressant, and anti-anxiety effects. When treating a range of physical symptoms in individuals with neurotic disorders, antidepressants have the most noticeable impact.

Soft neuroleptics (sulpiride, thioridazine) are advised for people with hypochondriacal illnesses who have an obsession with their emotions. B-blockers (atenolol, metoprolol) and a-blockers are used to address autonomic dysfunction. When treating patients who have a propensity for arterial hypertension, tachycardia, arrhythmia, and hyperventilation syndrome, b-blockers are especially recommended. In the latter instance, the impact of b-blockers' destination can shed light on the growing challenges associated with bronchial asthma differential diagnosis [13, 29].

Therefore, the ability to treat neurotic disorders with various autonomic dysfunctions in an integrated manner at the time of accurate diagnosis is improved by the current armament of medications of various classes and groups.

1.2. Treating somatoform illnesses using natural treatments

According to the complete psychogenic etiology, the idea of somatoform disorder was first presented in МКБ-10 and merged into a single category with neurotic and stress illnesses. Frequent somatic complaints, frequent visits to doctors of different specialties, the desire to perform various surveys, the onset of complaints before the age of 30, a history of stressors, the absence of an organic basis for the illness, and the existence of the disease for at least two years are all common indicators of neurotic somatoform disorders. Individuals with psychosomatic (somatoform) diseases never see a psychiatrist and are instead treated unsuccessfully by physicians from other fields for a long time [6, 30].

Therefore, it is crucial for medical professionals in all fields to be able to identify the symptoms of psychosomatic disorders and act quickly to refer patients

to a psychiatrist or appropriate therapy. Somatic symptoms might vary greatly. are most frequently found in the following areas: rheumatologic, cardiovascular, pulmonary, gastrointestinal, genitourinary, headaches, exhaustion, and low-grade fever.

The presence of symptoms in patients with anxiety is a common characteristic of all neurotic somatoform diseases, in addition to the signs of autonomic dysfunction. Numerous anxiety disorders, such as social phobia and particular phobia, and their associated autonomic symptoms are situationally induced, meaning that patients attempt to avoid the situations that trigger them. Anxiety symptoms frequently coexist with depressive symptoms (mixed anxiety-depressive disorder, depression masking) [1]. In patients with long-term, chronic somatoform illnesses, neurotic symptoms stabilize, neuroses form, and subsequently neurotic personality develops.

Simultaneously, typically to maintain and advance the structure of psychopathological syndrome, which was only planned during the initial phase of a neurotic reaction [2]. Psychotherapy should be the mainstay of treatment for somatoform disorders, with medication used as necessary. However, given the current state of affairs in Russia, this plan is not feasible due to a lack of qualified therapists, the difficulty of providing long-term, individual psychotherapy under psychiatric and psychotherapeutic service conditions, and the fact that most patients in commercial health facilities pay exorbitant prices for psychotherapy. [3]

Psychopharmacotherapy has advantages as well as disadvantages. A comparatively large selection of psychopharmacological agents, a favorable effect on patient compliance and the efficacy of psychotherapy, the ease and simplicity of medication administration, the speed of action, the potential for long-term outpatient use of many medications, and time savings for both the patient and the physician are some of the advantages [12, 24].

The lack of efficacy of drug therapy for certain types of neurotic disorders, its primarily symptomatic effect, the similarity of some drugs' side effects with neurotic symptoms and, consequently, the potential to exacerbate the latter during

treatment, the incompatibility of outpatient pharmacotherapy with some activities, neurotic individuals' pessimistic outlook toward psycho-pharmacological agents, the high cost of many modern medications, and the lack of authorization to use most new medications in children under the age of 15 are some of the drawbacks.

Antidepressants and tranquilizers are the most often utilized medications for treating neurotic somatoform disorders. Although tranquilizers' range of action encompasses nearly all psychiatric disorders at the non-psychotic level, they also have important adverse consequences for working men, such as lethargy, excessive daytime sleepiness, mental slowness, and motor reflexes. Furthermore, they are addictive during extended therapy, and short courses are frequently useless for treating neurotic disorders [17, 25].

Antidepressants should be used for conditions where depression symptoms predominate. They employ serotonin inhibitors and tricyclics (amitriptyline). Dry mouth, constipation, and urine retention are serious adverse effects of tricyclic antidepressants. Numerous studies have shown that selective serotonin reuptake inhibitors are generally more effective and better tolerated than tricyclic antidepressants. With the exception of sertraline, these medications are less readily available and cannot be used by minors. Soft neuroleptics (sulpiride, thioridazine) are advised for patients with hypochondriacal problems and emotional fixation. It is possible to employ nootropic medications as a supplement to primary treatment [10, 27].

B-blockers (atenolol, metoprolol, etc.) can be used to treat autonomic problems. This has a beneficial effect on anxiety symptoms generally and lessens tremor, tachycardia, and vegetative tension. But it is important to keep in mind that long-term b-blocker use can result in dependence. Since treating neurotic states typically takes time, medication safety and tolerability are particularly important. For this reason, herbal remedies-such as lavender, motherwort, mint, and others - that have been used for generations in folk medicine to treat anxiety and depression have rekindled interest in the scientific community. A portion of this interest was sparked by patient preferences.

According to the WHO, 80% of people worldwide choose herbal medicines [4], and patient medication confidence is a significant element in increasing treatment adherence, which in turn greatly influences the success of treating neurotic illnesses. Because of its hypnotic and sedative qualities, motherwort has been used for a long time in traditional medicine and is still a highly popular medication today. Motherwort has been shown to have impacts on sleep, including increased sleep quality, longer sleep duration, and shorter sleep [5,6].

A recent meta-analysis of sixteen randomized, placebo-controlled studies with 1093 individuals found that, motherwort helps people with insomnia sleep better without having any negative side effects [7]. Motherwort is therefore a safer substitute for benzodiazepines in the treatment of insomnia, which affects roughly one-third of adults. The side effects of motherwort are significantly lower. These include gastrointestinal issues, headaches, ataxia, and irritability [8]. Motherwort is regarded as a safe and effective treatment for sleep disturbances in both adults and children, including hyperactivity, according to the evidence-based medicine data currently available [9].

Apart from its well-known sedative and antianxiety properties, motherwort also has a consistent effect on the mental and physical symptoms of anxiety.

The neurobiological mechanisms of motherwort's effects involve agonistic action on adenosine benzodiazepine and A1 receptors, in addition to GABAergic transmission potentiation through enhanced GABA release, reuptake inhibition, and reduced metabolism. Numerous clinical and experimental studies indicate that the primary mechanism is the potentiation of GABAergic transmission, suggesting a neuroprotective effect. Motherwort exhibits sedative, soporific (improving sleep quality, extending sleep duration, and shortening the time to fall asleep), anxiolytic, and neuroprotective properties [15, 23].

Extracts of motherwort and lavender stand out among other herbal medicines. Lavender extract has strong sedative, anxiolytic, and antidepressant effects. It helps to relieve anxiety, tension in the neurological system, and emotional instability by improving the way the central and autonomic nervous

systems work. Additionally, it promotes cognitive abilities, elevates mood, and restores regular sleep patterns.

Linalool, one of the main active ingredients in lavender extract, has depressive effects on the central nervous system. Furthermore, the extract's sedative and calming effects are caused by linalyl acetate and flavonoids, which interact with benzodiazepine receptors to improve GABAergic transmission. Patients with mild anxiety and depression can benefit from lavender, particularly if their symptoms are linked to neurotic reactions or psychovegetative imbalance. In situations where anxiety, impatience, or autonomic signs (such tension or palpitations) predominate, it acts quickly. In general, lavender extract is well tolerated; when stopped, no withdrawal symptoms or dependence are seen [7, 18].

It is well known that motherwort extract (Leonurus cardiaca) has anxiolytic, cardioprotective, and mild sedative properties. It has long been used to treat the symptoms of cardiac neuroses, irritability, and neurological excitability. Alkaloids (such leonurine) and flavonoids, which alter neurotransmitter systems and aid in the inhibition of the central nervous system, are thought to be responsible for the soothing effects of motherwort. Motherwort extract helps restore heart rhythm, lessens emotional lability, and eases vegetative-vascular dystonia symptoms, particularly when brought on by psycho-emotional stress. Its effects are especially noticeable in people who have neurotic symptoms, anxiety-related sleep disorders, and functional cardiac abnormalities [9, 21].

Clinical findings support its beneficial benefits on the mental and physical aspects of anxiety without causing adverse effects like fatigue or drowsiness. Motherwort is safe and well tolerated for long-term use, and it is non-addictive like lavender. Herbal medications provide considerable potential for treating somatoform illnesses since they improve the patient's condition by affecting both the somatic and mental symptoms. They are more readily available, though, and they have less adverse effects. If there is no proof that the patient's problem is due to a neurotic disorder, they may also make a prophylactic appointment. Additionally, patients' more favorable attitudes about herbal medications than

psychotropic ones are a significant component in the therapy of somatoform illness [4, 28].

1.3. The technological facets of solid dosage form manufacturing

Around 80% of completed pharmaceutical products worldwide are tablets, a commonly utilized dose form. Their advantages include exact dosing of active medical substances, long-term stability of compressed pharmaceuticals, convenience of administration, storage, and transportation, and a high degree of mechanization in production stages, which provide efficiency, cleanliness, and sanitation. Protective coatings can be used on less stable materials. Tablets allow for the combination of physicochemically incompatible medicinal characteristics, the masking of undesirable organoleptic properties (taste, smell, and color) through coatings, and the use of pH-sensitive coatings to enable targeted drug release in particular gastrointestinal tract regions. Furthermore, tablets use core technologies and specific coatings to enable prolonged drug action, multi-layer designs to control the sequential absorption of several substances, and surface technology to minimize dispensing and administration errors [3, 20].

Grinding, granulating, and tableting are processes used in the production of powdered material dosage forms in addition to mixing and compression.

Drug grinding is used to increase technological and biological effects, remove big aggregates from clumping and bound components, and achieve homogeneity of mixing.

The physico-chemical and technological characteristics of the medicinal ingredients, their quantity in the tablet composition, their resistance to environmental influences, and other considerations all play a role in choosing the best technological plan for tablet manufacture.

There are currently two main techniques for producing tablets: granulation and direct compression of materials [1, 15].

For direct compression, size, particle strength, compressibility, fluidity, moisture content, and other characteristics of the material are important for direct

compression. are crucial. As a result, oblong-shaped particles are ideal for making sodium chloride tablets, and round-shaped particles are nearly impossible to compress. Coarse powders with equiaxed particle shapes and low porosity, including lactose, phenyl salicylate, hexamethylenetetramine, and other medications in this class, exhibit the best fluidity. As a result, these medications could be compacted preliminary granulation. 0.5–1.0 mm particle sizes, a bulk density of 350 kg/m3, a porosity of less than 35%, and an angle of repose of less than 42º are all characteristics of well-proven medicinal powders [10, 27].

They typically do not contain a lot of small fractions and are made up of enough izodiametrical particles with roughly the same fractional composition. The ability to evenly pour out of the funnel by its own weight - also known as spontaneous volumetric dosing - and a sufficiently high compressibility are what bind them together.

However, the great majority of pharmaceuticals cannot self-dose because they contain a large percentage (70%) of tiny fractions and surface imperfections that result in high interparticle friction. These situations include the addition of auxiliary compounds that belong to the sliding class of auxiliary substances and improve the flow characteristics. However, this approach is only used for a small number of medications [4, 19].

Granulation is necessary to increase the flowability of tableting mass because it significantly reduces the total surface area of particles when they coalesce into granules, which in turn reduces the friction that occurs when these particles move. The variation in the specific gravity and particle size parameters of the medicinal and auxiliary components that make up a multicomponent powder mixture usually causes delamination. A funnel or tableting machine vibrating in a different way can achieve this separation.

Tableting mass stratification is a risky and inappropriate procedure that can lead to dose violations and, in certain situations, nearly total problems with the component with the mixture's highest specific density. Granulation helps to avoid this risk because it causes particles with varying sizes and specific gravities to

agglomerate. Granules that have formed gain a consistent bulk weight as long as their sizes are similar. Granule strength is also crucial since robust granules have superior flowability and are less prone to abrasion [15, 23].

Current granulation processes for tablet production are categorized into three main types: dry granulation, wet granulation (also known as granulation by punching), and structural granulation.

Wet mixing of powders enhances their ductility, eliminates stratification of mass and particle separation, and significantly improves their unequal distribution. Due to air displacement, some sealing mass is created when the wet powder is mixed, resulting in more dense solid granules. Wet mass mixing time: 7–10 minutes for simple combinations, 15–20 minutes for complex mixtures.

Based on the physicochemical characteristics of powders, the ideal humidifier dosage is established experimentally and outlined in the rules. If there is not enough humidifier introduced, the pellets will crumble after drying; if there is too much, the mass will be thick, sticky, and poorly granulated. The ideal humidity content of weight is a moist, compact mixture that separates into distinct clumps when squeezed and does not adhere to the hand [6, 25].

There are several kinds of dryers for drying. A residual is the amount of moisture that must be present in the dried granules prior to compression. Each tablet medicine has a unique residual humidity that should be at its ideal level; that is, the tablets' quality should meet the GF's requirements and their strength should be the highest when compared to tablets made from granules of the same drug with varying humidity levels. Granules that have been dried adhere to the punches, fill the matrix unevenly, and demand more anti-friction materials. It is difficult to press the over-dried granules, and tablets with timpaired edges are possible.

The granules could consolidate into distinct lumps when they dry. Dried granules are run through a granulator with 1.5 mm grid pores to guarantee a consistent fractional composition, which essentially maintains a steady tablet weight. After adding an antifriction ingredient, the granules were pulverized and moved on to the tableting stage [5, 22].

Rotating and eccentric or percussion tablet machines are the most common types. Controlled tablet weight and potential mechanical inclusions are part of the tableting process. Find the mass of the tablets using hand weights. There are automatic systems that will turn on the indication light if the tablets' weight deviates from the designated weight [11, 28].

The gadget, which identifies and extracts tablets with metallic inclusions from the stream, produces automatic control over metallic inclusions. When the compression tablets are closed, they are put in installation, which has a vacuum cleaner for dedusting.

The press tool's condition, wear resistance, compression rate, and pressure all affect the quality of the tablets. Due to excessive loads, it is susceptible to severe wear. Because of friction and chemical reactions between the stiff loading matrix and the tableting bulk between the tablet and pressed material particles and the matrix walls, resistance matrices are two to three times less than punches [7, 18].

Conclusions to chapter 1

1. Data from the literature on the pathophysiology and etiology of somatoform diseases has been thoroughly examined. The study emphasizes how complex these disorders are, highlighting the part played by neurochemical imbalances, psychosocial stressors, and malfunctions in the central and autonomic nervous systems.

2. With an emphasis on the use of contemporary excipients and technologies, a thorough examination of the state of solid dosage form manufacture has been conducted.

CHAPTER 2
OBJECTS AND METHODS OF RESEARCH

2.1. Objects of research

Dry extract of Lavender (Lavandula angustifolia) – is a fine powder of light greenish or brownish color with a pleasant aromatic odor and slightly bitter taste. It is readily soluble in water, 96% ethanol, and acetone. The extract contains a complex of biologically active substances, including essential oils (primarily linalool, linalyl acetate), flavonoids, coumarins, phenolic acids, tannins, and triterpenes. The essential oils are responsible for the sedative, antiseptic, and anti-inflammatory properties of lavender. In particular, linalool and linalyl acetate contribute to the modulation of the central nervous system and exhibit anxiolytic and antidepressant effects. Additionally, flavonoid compounds have antioxidant and mild spasmolytic activity. Lavender extract demonstrates bactericidal and fungicidal effects due to the presence of phenolic and bitter substances.

Dry extract of Motherwort (Leonurus cardiaca) – is a light brown, finely dispersed powder with a characteristic odor and a slightly bitter taste, easily soluble in water, 96% alcohol, and acetone. The extract is rich in alkaloids (such as leonurine), essential oils (up to 0.3%), which include as well as organic acids, ascorbic acid, carotenoids, mucilages, gums, mineral salts, sugars, bitterness, and tannins. This composition ensures the extract's sedative, cardiotonic, and antioxidant properties. The essential oil components provide a lemon-like aroma and contribute to the calming effect on the central and autonomic nervous system. The extract is commonly used for nervous excitability, functional cardiac disorders, and mild forms of anxiety.

Lactose. Disaccharide groupings that contain carbohydrates that are found in milk and dairy products. Lactose residues, glucose, and galactose molecules make up the molecule.

Potato starch dry. It is odorless, white with crystal, has a mass fraction of 17–20% humidity, and is free of mechanical contaminants. Sulfur dioxide content,

ash content, normalized humidity, acidity, and the quantity of specks (unseparated pulp particles).

Microcrystalline cellulose. MCC, a dietary fiber concentrate, is the purest form of cellulose that is produced by finely grinding and thoroughly cleaning cotton cellulose. white powder. Odorless and tasteless.

Ethyl alcohol 96%. This liquid is colorless, clear, volatile, hygroscopic, and has a distinct burning flavor and smell.

Methyl cellulose. Fiber powder has almost little flavor or smell. It is soluble in cold water, gels when heated, and coagulates when heated and boiled for an extended period of time.

Sodium glycolate. White powder that has no flavor or smell.

Aerosil. Belongs to the class of artificial mineral fillers that are very active. White, amorphous, non-porous, indifferent powder that is widely distributed.

Calcium stearate. A combination of calcium salts of fat acids, primarily stearic and palmitic, that have a comparable 9–15% calcium oxide content. is a fine white or yellowish white powder that feels oily to the touch and has a faint, distinctive smell.

Kollidon 25 belongs to the class of N-vinylpyrrolidone (NVP) derivatives, which also includes soluble povidones and insoluble crospovidones. It is an amorphous white powder with a faint pinkish hue. Kollidon 25 works particularly well with aqueous or solvent-based binders in wet granulation procedures at concentrations of 1–5%. At comparable concentrations, it can also be employed in direct compression.

2.2. Methods of research

Physical and chemical properties

Shape and size of particles. A microscope fitted with a micrometer grid at 400 or 600 times magnification is used to measure the length and width of powder particles in order to determine their size.

The form of the particles is determined by comparing their average length to breadth. The particles are conditionally classified into three primary types using this method: elongated, which have a length-to-width ratio greater than 3:1; lamellar, which have a length that is greater than three times that of breadth and thickness; and equiaxed, which have a spherical, polyhedral shape that is nearly izodiathermic.

Specific surface area - entire surface area that a powdered material occupies, as well as the contact surface-the surface created when the powder particles come into contact with one another.

The mass to volume ratio of the medicine with zero powder porosity indicates the true density of the powder. Use any liquid as a comparison that wets but does not dissolve the powder. A pycnometer is used for determination.

Hygroscopicity. In contrast, the powder mass prepared for tableting begins to collect vapor from the air and blur in absorbed water if the air's vapor pressure is greater than the surface elasticity of solids. Weight-based measurements of the kinetics of moisture absorption under (normal) everyday conditions, extreme conditions (desiccator over water, 100% relative humidity), or climatic chambers. The employment of auxiliary chemicals, or moisture stimulants, is determined by how hygroscopic a substance is.

Technological properties

Granulometric composition Powder flowability, tablet weight consistency, dosing accuracy, and tablet quality (appearance, disintegration, and strength) are all impacted by particle size distribution. Sieve analysis is the most often used analytical technique. A 100.0 g powder sample is shaken for five minutes (either by hand or using a vibration device) on top of the top sieve of a conventional sieve set. A percentage of the total is then calculated by measuring the mass of each fraction that is retained on each sieve.

Tapped density is the mass of a powder per unit volume following tapping-induced settling. Particle size, shape, density, and moisture content all play a role. Predicting the necessary matrix volume during tablet compression is made easier

with the use of taped density. A measuring cylinder is filled with 5.0 g of powder (accurate to 0.001 g) in order to determine it. The oscillation frequency and amplitude of the device are tuned to 100–120 oscillations per minute and 35–40 mm, respectively. The tapped volume is then recorded when the tapping continues (often for around ten minutes) until the volume stabilizes.

Compression ratio represents the degree of volume reduction during compression and is calculated as the ratio of the height of the powder in the matrix (H_1) to the height of the final tablet (H_2). The matrix is packed with powder and squeezed at 1200 kg/cm² in order to ascertain it. After then, the tablet is expelled, and its height is recorded. The shape of the particles and their capacity to reorganize and deform under pressure determine compression. Greater volume reduction is indicated by a higher compression ratio, necessitating longer pressing times and more effort to expel the tablet from the die.

Flowability (fluidity) is the powder's capacity to flow freely under gravity and guarantee that the die cavity is filled uniformly. Inconsistent tablet weight and density as well as sticking in the hopper are caused by poor flowability. A 50.0 g sample (or 30.0 g for low-density powders) is released from the funnel, and the flow duration is recorded with an accuracy of 0.2 seconds using a vibrating funnel device. Additionally, the angle of repose is calculated; a value of 25–30° denotes good flowability, whereas a value of 60–70° denotes poor flow. A crucial component of tablet manufacturing technique, flowability is influenced by granulometric composition, moisture content, particle size, and form.

Compressibility is the capacity of powder particles to stick together and create a solid compact under pressure as a result of mechanical, electrical, adsorption, and molecular forces. The strength of tablets created after compression is a common way to quantify compressibility, even though there are no precise ways for doing so. Strong, stable tablets are produced by good compressibility, whereas brittle or disintegrating pills are produced by poor compressibility.

A 0.3–0.5 g powder sample is compressed in a 9 mm matrix at 120 MPa using a hydraulic press in order to assess compressibility. A Pharma Test gadget

weighs the resultant pellet and measures its crushing strength, which is then given in kilograms or Newtons. Greater strength is correlated with improved moldability and compressibility.

Evaluation of external appearance of tablets. After seeing 20 tablets, viewers draw conclusions on surface flaws or their absence. Using vernier calipers, measure the tablet us height and diameter based on its kind, color, and separation exposure.

Determination of tablet disintegration. The State Pharmacopoeia of Ukraine (SPhU) states that the "swinging basket" gadget type and method are used to measure tablet disintegration.

Determination of the mechanical strength of tablets. Devices that allow us to assess the compressive strength (split) and others that allow us to determine the abrasion were used to determine the mechanical strength of the tablets.

Compressive strength. Several tools, such the TÒâ company "Erweka" (Germany), can be used to measure the mechanical strength of tablets under compression. The idea behind them all is a spring balance.

Abrasion resistance. The degree of tablet abrasion is another characteristic that defines mechanical strength. The cylinder-type apparatus known as a friabilator or firm "Pharma Test" is used to test abradability. During the abrasion process, form tablets should not alter. At least 99% abrasion resistance is required. Abrasion resistance for trituration and coated tablets is unknown.

Conclusions to chapter 2

1. Methods for studying the technological, chemical and physical characteristics of tableting materials and excipients are outlined. These methods assess such characteristics as compressibility, flowability and compatibility with active ingredients.

2. Control measures are outlined to ensure the quality of the formulated tablets. These include tests for stability, dissolution, disintegration, hardness and weight uniformity.

CHAPTER 3
DEVELOPMENT OF TECHNOLOGY AND FORMULATION FOR SEDATIVE TABLETS

3.1. Investigation of dry extracts' physicochemical and technological characteristics.

Finding more effective natural medications, especially those derived from plants, is one of the primary goals of contemporary pharmaceutical science. is the actual production of novel medications derived from well-known medicinal plants, the composition and function of which have been thoroughly investigated.

The physicochemical, structural, and technological characteristics of the material influence how it behaves during tablet preparation and storage. We have conducted research to ascertain the form and size of powder particles in dry extracts of motherwort and lavender.

A laboratory microscope with a 250-fold magnification was used for the studies.

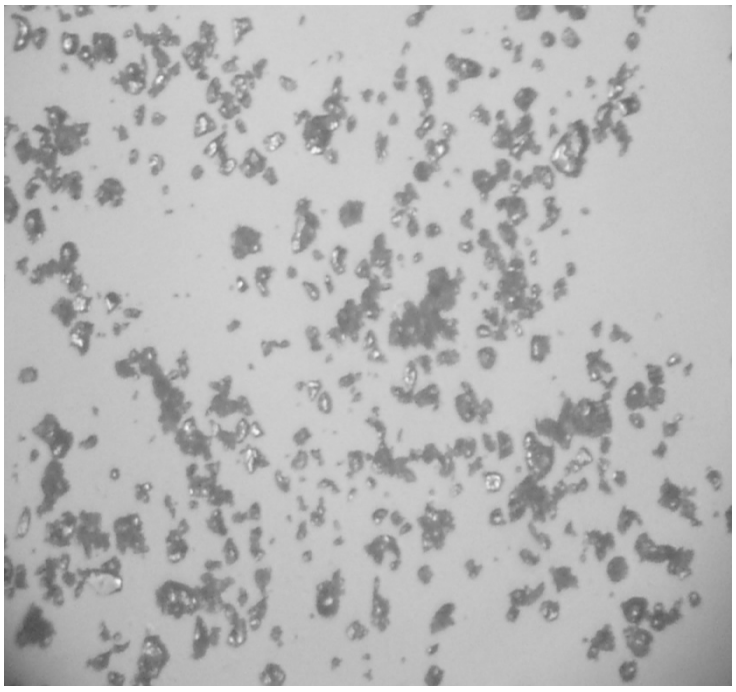

Fig. 3.1. The dimensions and form of the lavender extract particles

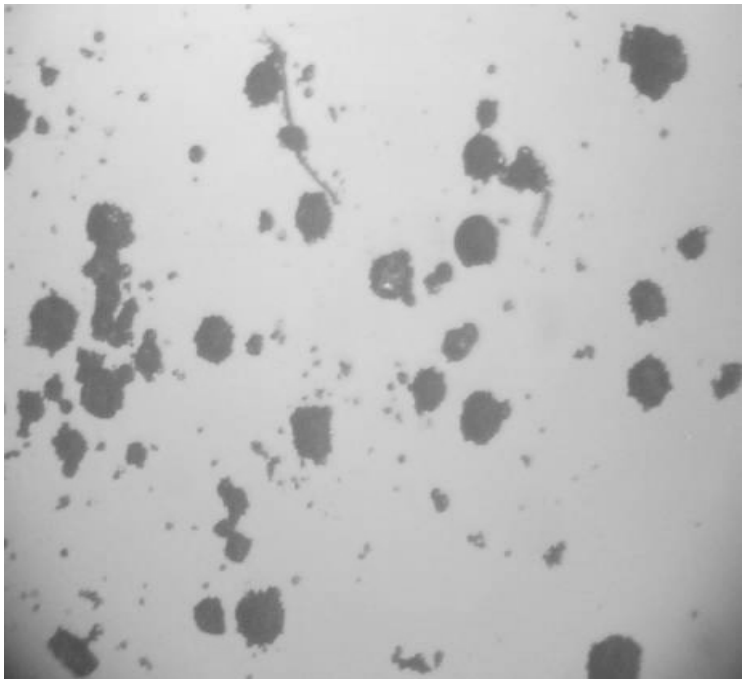

Fig. 3.2. The dimensions and form of the motherwort extract particles

Below 0.2 mm, a vast number of rough-surfaced anizodiathermic particles with a high fine fraction composition form and as a result, may demonstrate poor flowability, according to studies of the shape and particle size of powders that are susceptible to tableting. Poor process performance is shown by the data obtained about the shape, surface topography, and particle size structure of motherwort and lavender dry extracts (Figure 3.1, 3.2). Tablets are produced unevenly by mass and strength, and they will be poorly dosed by volume using a tableting machine.

Flowability, bulk density, density, and compressibility are factors that affect the preparation process to achieve high quality. Poorly flowing material in the hopper sticks to the walls, disrupting the rhythm of its entry into the matrix. As a result, the tablets' specific mass and density will differ. The size, shape, density, and moisture content of the powder particles (granules) all affect the tapped density. The volume of the matrix channel can be predicted based on the bulk density. Its flowability is somewhat influenced by its fractional (granulometric) composition, which in turn affects the tableting machine's rhythmic operation, the

stability of the final tablet mass, the drug's dosage accuracy, and the tablet us qualitative qualities (appearance, disintegrants, strength, etc.).

Table 3.1

Technological parameters of dry extracts of lavender and motherwort

Indicators	Extracts of lavender	Extracts of motherwort
Humidity, %	6,8± 0,2	4,8± 0,2
Flowability, g/s	2,1 ± 0,2	3,2 ± 0,2
Angle of repose, degree	34,0 ± 2,0	38,00 ± 0,20
Compressibility, H	3,0 ± 0,5	6,15±0,7
Bulk density, g / cm³: before compaction after compaction	 0,585 ± 0,127 0,740 ± 0,056	 0,66 ± 0,031 0,820 ± 0,065
Porosity, %	40,00 ± 0,40	54,2+0,21

In order to determine the angle of repose simultaneously, the flowability of dry powder extracts was investigated using a vibrating funnel. Table 3.1 presents data indicating that the bulk density is moderate, the porosity is not greater than 54.2 + 0.21% for the motherwort extract and 40 ± 0.40 for the lavender extract, and the flowability of powdered dry extracts is regarded as unsatisfactory. Poor flowability is indicated when the angle of repose is greater than 30 degrees.

This percentage of fine powder, which has an 11.0% content of 0.25–1 mm, contains more than 82% (motherwort extract) and 73.64% (lavender extract), according to the study of the fractional composition of dry extracts of motherwort and lavender ordinary (Table 3.2.). The flowability of the substance to be tableted, dosing precision, and the viability of using the direct compression method for tableting are all significantly impacted by this.

By employing directed granulation, which yields a particular quantity of coarse fractions, the fractional composition of the powders can be altered.

Table 3.2

Fractional composition of powders of drugs active ingredients

Indicators	Extracts of lavender	Extracts of motherwort
Size of sieve holes, mm:	Fractional composition, %	
0,5	0,50 ± 0,10	2,57± 0,10
0,3	2,50 ± 0,20	5,14± 0,21
0,2	8,00 ± 0,30	9,66± 0,32
0,1	45,50 ± 0,20	21,22± 0,12
0,05	36,50 ± 0,10	54,42± 0,20

Dry extracts are known to be hygroscopic in most cases. We investigated the moisture absorption of extracts at 100% and 40% relative humidity, as indicated in Figs. 3.3 and 3.4.

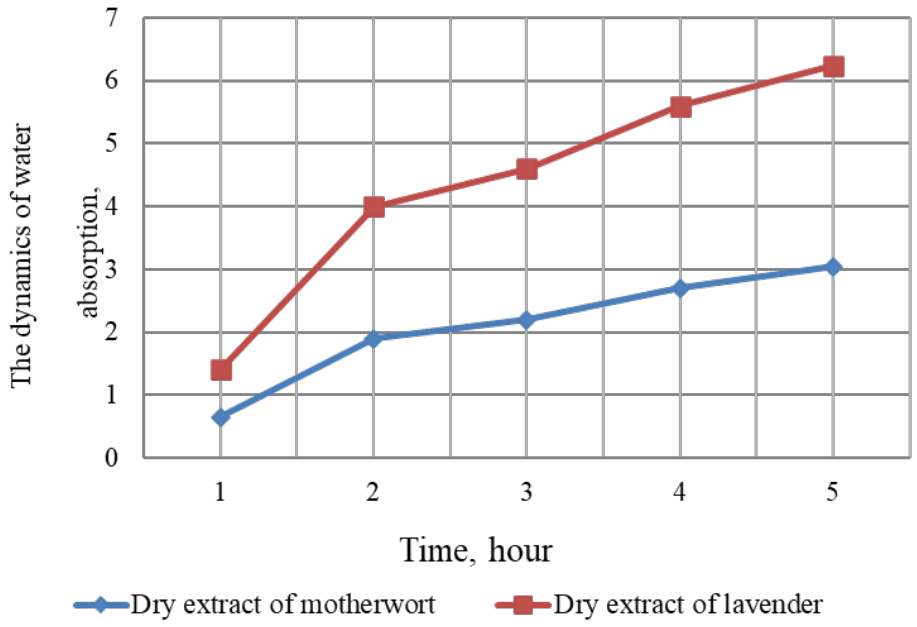

Fig. 3.3. Motherwort and lavender dry extracts' water absorption kinetics at 100% humidity

Observations of the stability of extracts at 100% relative humidity revealed that, after five hours, objects had changed in appearance and consistency while also gaining mass as a result of moisture absorption. Both extracts formed a thick, viscous material after five hours of investigation. Only a small range of extract humidity - between 4.3% and 4.8%-causes irreversible quality loss, which should be taken into account when creating the solid dosage form. Excessive extract wetting can lead to deterioration of tablet mass flowability and tablet adhesion to the press mold (figure 3.3).

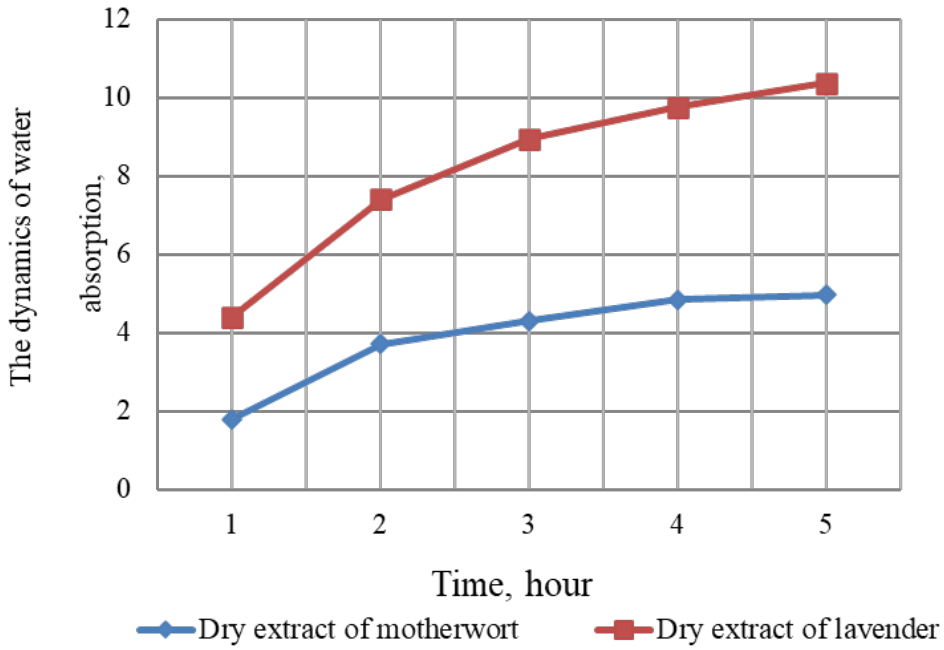

Fig. 3.4. The dynamics of motherwort and lavender dry extracts' water absorption at 40% humidity

An analysis of water absorption at 40% relative humidity revealed that there is little variation in moisture absorption (Figure 3.4).

The findings of the study on the properties of technical extracts show that without the addition of suitable flowable and moisture-saving components, the data of the substance cannot be employed in technology.

3.2. Investigates the mass samples' technological characteristics for tableting.

Grinding, granulation, and tableting are the next steps in the process of creating dosage forms from powdered material, aside from mixing and compression.

The direct compression method offers a number of benefits. Through the elimination of numerous procedures and steps to reduce the use of multiple pieces of equipment, reduce production space, and lower labor and energy costs, it enables high labor productivity and greatly reduces process cycle time. Tablets made of incompatible, heat-labile, and moisture-sensitive materials can be produced by direct compression.

Therefore, by adding auxiliary compounds that improve the material's technological qualities, we have thought about the potential of tableting without granulation.

Quantification of the dry extract content in a single tablet that we chose after doing a literature analysis. We were instructed to take 45 mg of Motherwort dry extract per tablet and 50 mg of lavender extract per tablet in order to have a tonic and calming impact on the body without producing a hypnotic effect starting with 60% of the tablet's total weight consisting of a mixture of dry extract (MDE), dry extracts were added to a tableting mixture. Individual chemicals and their combinations were employed in equal amounts as fillers. The outcomes are displayed in Table 3.3.

The table shows that, in comparison to the powder dry extracts, the resulting mass's technological features are better. The filler mixture had the highest flowability, ranging from 6.70 to 8.60 g/s. At the same time, though, the samples did not meet the requirements to produce tablets of them. Every sample's compressibility was close to the lowest bounds.

Table 3.3

Tablet combinations' technological properties for direct compression

Components	Flowability, g / s	Angle of natural slope, ^{0}	Compressibility, H	Packed density, g / cm³	
				V_0	V_{1250}
MDE Lactose	3,2 ± 0,5	42,0 ± 4,0	13,3 ± 0,4	0,576 ±26,0	0,853± 52,0
MDE MCC 101	4,1 ± 0,5	38,0 ± 3,0	14,1 ± 0,3	0,587 ±33,0	0,825 ± 46,0
MDE Potato starch	8,3 ± 1,0	27,0 ± 0,5	16,0 ± 0,8	0,820 ±47,0	0, 943± 61,0
MDE Lactose + potato starch	7,6 ± 0,8	32,0 ± 2,0	16,5 ± 0,9	0,615 ±24,0	0,876 ± 50,0
MDE Lactose + MCC 101	6,7 ± 0,8	30,0 ± 2,0	16,3 ± 0,9	0,575 ±24,0	0,775 ± 50,0
MDE Potato starch + MCC 101	8,6 ± 0,8	25,0 ± 2,0	15,9 ± 0,9	0,715 ±24,0	0,846 ± 50,0

In this sense, a mixture of auxiliary substances was granulated by wet granulation in order to enhance the technological properties of the tableting mass and indicators of tablet quality. Granulation is necessary to increase the flowability of tableting mass because it reduces the total surface area of particles at the time of conglutination into granules, which in turn reduces the friction between these particles when they are moving. The difference in particle size and specific density among the medicinal and auxiliary components that make up a multicomponent powder mixture is usually the cause of delamination.

A funnel or a tableting machine vibrating in a different way can cause this form of delamination. Tableting mass delamination is a risky and inappropriate procedure that, in certain situations, results in nearly total isolation of the mixture's greatest specific density component and dose violations. Granulation avoids this risk since it causes particles of various sizes and densities to agglomerate during its process. When formed granules are of the same size as the resulting granules, their bulk weight remains constant. plays a significant part in granule strength as well; strong granules have superior flowability and are less prone to abrasion.

Table 3.4

Tablet mix compositions derived from wet granulation

Components	№ of tablets composition			
	1	2	3	4
MDE	0,095	0,095	0,095	0,095
MCC 101	0,055	0,055	0,055	0,055
Potato starch	0,055	0,055	0,055	0,055
Ethyl alcohol 96%	0,042			
Starch solution 5%			0,047 (0,0024)	
Solution of MC 3%		0,034 (0,001)		
Solution of collidone 5%				0,033 (0,0017)
Sodium glycolate	0,030	0,030	0,030	0,030
Aerosil 200	0,005	0,005	0,005	0,005
Calcium stearate	0,002	0,002	0,002	0,002
Tablet weight , g	0,242	0,243	0,244	0,244

We have selected a 1:1 blend of starch and MCC as a filler for more research. Starch paste, 96% ethanol, methylcellulose solution, and purified water, and collidone solution were utilized as wetting agents (Table 3.4.). Aerosil was added to maximize the flowability of hygroscopic powders, sodium glycolate,

which facilitates the breakdown of the dosage form in a liquid media, and extenders of extracts were combined to create the dry granulation mixture. Data from the literature regarding the manifestation of particular pharmacological activity was used to determine the dosage of motherwort and lavender extracts. 0.045 mg of motherwort extract for the manifestation of a calming impact on the nervous system and 0.050 mg of lavender extract per receipt as a regulating activity of the cardiovascular system.

A laboratory granulator with holes that were 2 mm in diameter was used to do the granulation. Granulate was dried to constant weight at 40 °C in an oven. calibrated after passing through a sieve with a 2 mm hole diameter. At the point where the granules were powdered, calcium stearate and sodium glycolate were added. Table 3.5 lists the properties of the granulates produced by wet granulation.

Table 3.5

The primary technological characteristics of granulates are dependent on the humidifier type

Indicators	Sample			
	1	2	3	4
Flowability, g / s	6,55±0,02	4,94±0,09	13,02±0,02	7,02±0,01
Compressibility, g / cm	24,50±0,56	27,44±1,75	38,38±2,05	86,87±0,49
Humidity,%	3,40±0,01	4,40±0,04	2,45±0,03	3,06±0,08
Tapped density g/cm ^{3}:				
V_0	0,586 ± 0,23	0,571 ±0,20	0,670 ±0,34	0,656 ± 0,37
V_{1250}	0,837 ± 0,48	0,792 ± 0,38	0,840 ± 0,45	0,891 ±0,39

The results show that the compositions have good qualities, with the mixture that has been moistened with 5% starch paste having the best humidity, flowability, and compressibility. The technological features of the tablets are shown in Table 3.6 according to the humidifier type.

Table 3.6

The humidifier affects the tablet quality characteristics

Sample	Abradability, %	Disintegration, min	Strength, MPa
1	3,86±0,03	3,0±1,6	0,29±0,95
2	0,64±0,07	12,0±1,6	0,69±0,36
3	0,74±0,02	6,0±1,6	0,45±1,34
4	0,26±0,01	14,0±1,6	0,67±0,36

The tablets made by moistening ethyl alcohol have the highest rate of disintegration and do not exceed SPhU's requirements for abradability (1%), as evidenced by their extremely minimal 0.29 MPa mechanical strength, according to the data shown in Tables 3.5 and 3.6. Using methylcellulose and kollidon humidifier solutions, it was found that the disintegration time increased while the mechanical strength and abradability simultaneously increased. The crucial value of the disintegration indicator is the tablets of samples № 2 and № 4.

After 5% starch paste is humidified, tablets are produced with a sufficient crushing strength of 0.45 MPa, a disintegration period of 6 minutes, and an absorbability that satisfies SPhU standards. These investigations lead to the conclusion that 5% starch paste is an effective humidifier for tablet bulk.

The amount of polyphenolic chemicals released from the tablets is of special interest and was the subject of the study's subsequent phase.

As demonstrated by the findings in Figure 3.5 Three tablets of all compositions release bioactive substances uniformly, but composition №3's release profile is much lower than the others' (approximately 56% of the active substance is passed in the solution within 45 minutes), which is not in compliance with regulatory document requirements.

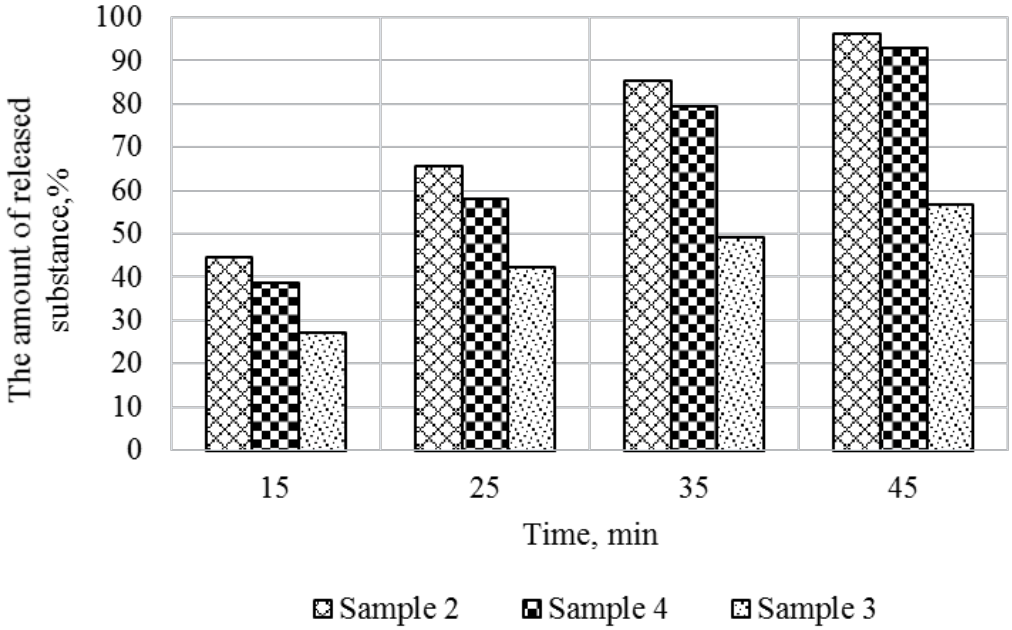

Fig. 3.5. The quantities of polyphenolic compounds released from tablets with varying compositions 2, 3, and 4 (compositions, table 3.4)

Provide maximum-release tablets with composition №2 (5% starch paste humidifier). Considering the signs of tablet disintegration, we have selected composition №2.

As a result, we created a pill formulation that includes dry motherwort and lavender extracts.

Composition	g
Dry extract of lavender	0.050
Dry extract of motherwort	0.045
Starch of potato	0.056
MCC 101	0.055
Glycolate sodium	0.030
Aerosil	0.005
Calcium stearate	0.002
Tablet weight, g	0.243

Figure 3.6 displays the technological system for tablets made by wet granulation

Fig. 3.6. Diagram showing the technological procedure used to produce tablets containing dry motherwort and lavender extracts

Conclusions to chapter 3

1. Excipients and active medicinal ingredients have had their physical, chemical, and technical characteristics carefully studied. In this study, factors like solubility, stability, compatibility, and other qualities that are essential to guaranteeing these compounds' successful incorporation into tablet formulations were evaluated.

2. Excipients' effects on the pharmaco-technological characteristics of granulates and the consequent tablets have been thoroughly investigated. This involves assessing how they affect important metrics including stability, flowability, and compressibility. In order to guarantee adherence to pharmaceutical standards, the quality criteria of the tablet samples acquired during the research process - such as weight uniformity, hardness, disintegration time, and dissolution rate - have also been meticulously monitored and examined.

3. A comprehensive technological strategy has been put up for the manufacturing of tablets that contain plant extracts and are intended to treat psycho-emotional illnesses. This plan guarantees the reliable production of safe and efficient tablets by outlining every step of the manufacturing process, from granulation and mixing to compression and quality monitoring.

CONCLUSIONS

1. The existing status of pharmacotherapy for nerve diseases, the names of the medications used to treat them, and the justification for developing a novel tablet-based medication were all examined throughout this investigation.

2. The physico-chemical and technical characteristics of the active ingredients in dry extracts of motherwort and lavender were examined. discovered that the substance had little flowability and was highly hygroscopic.

3. The impact of supplementary materials on the mass's technological properties for tableting was investigated. It has been determined that compositions that are humidified by 5% starch paste have the greatest results in terms of flowability, compressibility, and humidity indicators.

4. The quality criteria for the collected tablet samples were established. According to our research, the 5% starch paste wet has an abradability of 0.45 MPa, a disintegration period of 6 minutes, and a crushing strength that is adequate. that satisfies SPhU standards. These investigations lead to the conclusion that 5% starch paste is an effective humidifier for tablet bulk.

5. Profiles of the "in vitro" release curves of the polyphenolic compounds from the tablets were examined, together with the installed character of the influence of auxiliary chemicals, which helped to justify the ideal composition.

6. The technology and composition of a new treatment in the form of sedative-acting pills can be developed thanks to the data obtained.

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APPLICATIONS

Application A

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

of cardiovascular disease, especially useful for military personnel, helping to prevent heart disease, improve endurance and increase overall resilience in high-stress environments.

Aim. To investigate the elemental composition of the thick extract of *Daucus sativus*.

Materials and methods. The elemental composition of the thick extract of *Daucus sativus* was studied at the Institute of Single Crystals of the National Academy of Sciences of Ukraine by atomic emission spectrophotometry.

Results and discussion. The results of determining the elemental composition showed that the content of heavy metals in the studied extract sample was within the maximum allowable limits for medicinal plant material according to the requirements of the SPhU. According to the results obtained, it was found that the quantitative content is dominated by potassium and sodium, which have a positive effect on conduction of nerve impulses and contribute to the normalisation of the cardiovascular system; magnesium, phosphorus and calcium also are at high concentrations and in combination have a positive effect on the functioning of bone and muscle tissue, including the heart. The extract contains sufficient amounts of calcium, which is involved in the regulation of nerve impulses, muscle contraction, blood clotting and regulation of cell membrane permeability. Its companion element is magnesium, which reduces the level of the inflammatory marker C-reactive protein and plays an important role in metabolism. This element is involved in the implementation of antispasmodic activity, which will improve blood circulation around the affected tissues.

Conclusions. Thus, according to the results of the study, it can be predicted that the use of a thick extract of carrot roots as an active ingredient in a soft rectal medicinal product will potentially successfully affect the main links in the etiopathogenesis of cardiovascular diseases.

DEVELOPMENT OF THE COMPOSITION OF SEDATIVE TABLETS

Zakaria Anass
Scientific supervisor: Puliaiev D.S.
National University of Pharmacy, Kharkiv, Ukraine
d.s.puliaiev@nuph.edu.ua

Introduction. Concern over population mental health issues is growing on a global scale. According to World Health Organization (WHO) research in some nations, the great majority of instances of neurotic illnesses (neuroses) go misdiagnosed and untreated throughout life, affecting a significant portion of the population. Antidepressants, anxiolytics, and sedatives are psychotropic medications used to treat neuropsychiatric diseases, and they frequently have a lengthy half-life. As a result, their safety and tolerance are given particular consideration. The scientific community's quest for safe and effective psychotropic medications has reignited interest in herbal remedies.

Aim. Development of scientific composition of sedative action tablets.

Materials and methods. The object of the study is tablets, dry extracts of lavender and motherwort, excipients: potato starch, MCC, sodium glycolate, aerosil, calcium stearate. The subject of the research is conducting physico-chemical and technological tests of API, tableting mass and tablets.

The following test methods were used in the work: organoleptic (appearance); physical and chemical (moisture content, geometric size of tablets); technological (optical microscopy, sieve analysis, fluidity, angle of natural slope; bulk density and density after shrinkage; resistance to crushing, compressibility, disintegration); mathematical (statistical processing of results).

Ф А 2.2.1–32-366

National University of Pharmacy

Faculty pharmaceutical
Department of industrial technology of medicines and cosmetics

Level of higher education master

Specialty 226 Pharmacy, industrial pharmacy
Educational and professional program Pharmacy

APPROVED
The Head of department
of industrial technology of medicines
and cosmetics
Olena RUBAN
"02" September 2024

ASSIGNMENT
FOR QUALIFICATION WORK
OF AN APPLICANT FOR HIGHER EDUCATION

Anass ZAKARIA

1. Topic of qualification work: «Development of the composition of sedative tablets», supervisor of qualification work: Denys PULIAIEV, PhD, 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: solid dosage form, active ingredients: dry extracts of motherwort and lavender.

4. Contents of the settlement and explanatory note: literature review on the topic, objects and methods of research, experimental part, conclusions.

5. The work should contain tables, graphs, figures in a volume sufficient to cover the topic.

6. Consultants of chapters of qualification work

Chapters	Name, SURNAME, position of consultant	Signature, date	
		assignment was issued	assignment was received
1	Denys PULIAIEV, associate professor of higher education institution of industrial technology of medicines and cosmetics	09.09.2024	09.09.2024
2	Denys PULIAIEV, associate professor of higher education institution of industrial technology of medicines and cosmetics	18.11.2024	18.11.2024
3	Denys PULIAIEV, associate professor of higher education institution of industrial technology of medicines and cosmetics	03.02.2025	03.02.2025

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

CALENDAR PLAN

№	Name of stages of qualification work	Deadline for the stages of qualification work	Notes
1	Study of literary sources in the main directions of sedative drug development. Writing a literature review.	September 2024	**done**
2	Definition of objects and methods of research. Formation of the second chapter.	October 2024	**done**
3	Study of physico-chemical and pharmaco-technological properties of research objects.	January 2024	**done**
4	Substantiation of the composition and technology of sedative tablets with dry extracts. Formation of chapter 3.	April 2024	**done**

An applicant of higher education _____ Anass ZAKARIA

Supervisor of qualification work _____ Denys PULIAIEV

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 промислової технології ліків та косметичних засобів				
Закарія Анасс	Розробка складу таблеток седативної дії	Development of the composition of sedative tablets	доц. Пуляєв Д.С.	доц. Ковальов В.В.

Ректор

Вірно. Секретар

ФА2.8-03-317

ВИСНОВОК

експертної комісії про проведену експертизу
щодо академічного плагіату у кваліфікаційній роботі

здобувача вищої освіти

«02» травня 2025 р. № 331104327

Проаналізувавши кваліфікаційну роботу здобувача вищої освіти Закарія Анасс, групи Фм20(4.10) англ-02, спеціальності 226 Фармація, промислова фармація, освітньої програми «Фармація» навчання на тему: «Розробка складу таблеток седативної дії / Development of the composition of sedative tablets», експертна комісія дійшла висновку, що робота, представлена до Екзаменаційної комісії для захисту, виконана самостійно і не містить елементів академічного плагіату (компіляції).

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

Ф А 2.2.1-32-353

REVIEW

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

Anass ZAKARIA

on the topic: **«Development of the composition of sedative tablets»**

Relevance of the topic. The problem of creating solid dosage forms of combined action with the substantiation of the composition, the rational choice of excipients and the optimal technology is quite relevant and opens up new opportunities in the complex therapy of neurotic disorders.

Practical value of conclusions, recommendations and their validity. The analysis of literature sources on rational pharmacotherapy of neurotic disorders, considering their etiology and pathogenesis, was carried out, the range of drugs for the treatment of these pathologies available on the pharmaceutical market of Ukraine was studied, and the relevance of developing a new drug in the form of tablets with dry extracts of motherwort and lavender was proved. A technology for the manufacture of a medicinal product is proposed, according to which a technological scheme for its production is drawn up.

Assessment of work. The results of the experiments were statistically processed and presented in the work in the form of tables and graphs. The conclusions are the logical conclusion of theoretical and experimental studies.

General conclusion and recommendations on admission to defend. The master's work of Anass ZAKARIA meets all the requirements for qualification work and can be submitted for defense at the State Examination Commission of the National University of Pharmacy.

Scientific supervisor assoc. prof. Denys PULIAIEV

«13» of 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

Anass ZAKARIA

on the topic: **«Development of the composition of sedative tablets»**

Relevance of the topic. One of the urgent problems of our time is the increase in the growth of neurotic disorders. The range of medicines for the treatment of these pathologies of Ukrainian production is limited, most of the drugs have a unidirectional effect. Therefore, the development of domestic complex preparations of sedative action is an urgent task.

Theoretical level of work. Based on the literature data, the author substantiates the need to create sedative tablets. Anass ZAKARIA conducted a search for the most appropriate active substances and auxiliary components.

Author's suggestions on the research topic. As active ingredients, the author proposed dry extracts of motherwort and lavender. The expediency of using and experimentally confirmed number of excipients in the composition of the proposed preparation is substantiated.

Practical value of conclusions, recommendations and their validity. In the course of the work, the rational composition of the tablets was substantiated. The technology of tablets has been developed, according to which a technological scheme has been drawn up.

General conclusion and assessment of the work. The conclusions formulated in the work are based on experimental data and follow logically from the results obtained. The qualification work of Anass ZAKARIA meets all the requirements for qualification works and can be submitted for defense at the State Examination Commission of the National University of Pharmacy.

Reviewer assoc. prof. Volodymyr KOVALOV

«15» of May 2025

Ф А2.2.1-91-287

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

Витяг з протоколу
засідання кафедри промислової технології ліків та косметичних засобів НФаУ
№ 12 від 16 травня 2025 року

Голова: завідувач кафедри, доктор фарм. наук, проф. Рубан О. А.

Секретар: к. фарм. н., доц. Січкар А. А.

ПРИСУТНІ: зав. каф., проф. Рубан О.А., проф. Ковалевська І.В., проф. Бобрицька Л.О., проф. Гриценко В.І., проф. Сліпченко Г.Д., проф. Кухтенко О. С., доц. Безрукавий Є. А., доц. Кутова О. В., доц. Манський О. А., доц. Ніколайчук Н. О., доц. Пуляєв Д.С., доц. Січкар А. А., доц. Солдатов Д. П., доц. Трутаєв С. І., ас. Пономаренко Т.О.

ПОРЯДОК ДЕННИЙ:
1. Про представлення до захисту в Екзаменаційну комісію кваліфікаційних робіт здобувачів вищої освіти випускного курсу НФаУ 2025 року випуску

СЛУХАЛИ: про представлення до захисту в Екзаменаційній комісії кваліфікаційної роботи на тему: «Розробка складу таблеток седативної дії»
здобувача вищої освіти випускного курсу Фм20 (4,10) eng - 02 НФаУ 2025 року випуску Анасс ЗАКАРІЯ_____
(ім'я, прізвище)
Науковий (-ві) керівник (-ки) _к.фарм.н., доц. Денис ПУЛЯЄВ_____
Рецензент_____ к.фарм.н., доц. Володимир КОВАЛЬОВ_____

УХВАЛИЛИ: Рекомендувати до захисту кваліфікаційну роботу здобувача вищої освіти _5_ курсу Фм20 (4,10) eng - 02 _Анасс ЗАКАРІЯ_
(ім'я, прізвище)
на тему: «Розробка складу таблеток седативної дії»

Голова
завідувач кафедри,
доктор фарм. наук, проф. _____ Олена РУБАН
(підпис)

Секретар
к. фарм. н., доцент _____ Антоніна СІЧКАР(підпис)

Ф А2.2.1-32-042

НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

ПОДАННЯ
ГОЛОВІ ЕКЗАМЕНАЦІЙНОЇ КОМІСІЇ
ЩОДО ЗАХИСТУ КВАЛІФІКАЦІЙНОЇ РОБОТИ

Направляється здобувач вищої освіти Анасс ЗАКАРІЯ до захисту кваліфікаційної роботи
за галуззю знань 22 Охорона здоров'я
спеціальністю 226 Фармація, промислова фармація
освітньою програмою Фармація
на тему: «Розробка складу таблеток седативної дії».

Кваліфікаційна робота і рецензія додаються.

Декан факультету _____ / Микола ГОЛІК /

Висновок керівника кваліфікаційної роботи

Здобувач вищої освіти Анасс ЗАКАРІЯ виконав на кафедрі промислової технології ліків та косметичних засобів НФаУ кваліфікаційну роботу, яка присвячена створенню складу таблеток седативної дії.

В процесі роботи Анасс ЗАКАРІЯ дослідив загальні напрями етіопатогенезу та терапії невротичних розладів, обґрунтував доцільність створення та застосування таблеток із сухими екстрактами пустирника та лаванди. Автором було обґрунтовано оптимальний склад таблеток та розроблено промислову технологію їх отримання.

У цілому подана до захисту кваліфікаційна робота Анасс ЗАКАРІЯ на тему «Розробка складу таблеток седативної дії» відповідає вимогам, що висуваються до кваліфікаційних робіт, оцінюється позитивно і може бути рекомендована для захисту в Екзаменаційну комісію НФаУ.

Керівник кваліфікаційної роботи Денис ПУЛЯЄВ

«13» травня 2025 р.

Висновок кафедри про кваліфікаційну роботу

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

Завідувач кафедри промислової технології
ліків та косметичних засобів Олена РУБАН

«16» травня 2025 р.

Qualification work was defended

of Examination commission on

« » of June 2025

With the grade _____

Head of the State Examination commission,

D.Pharm.Sc, Professor

_____ / Volodymyr YAKOVENKO/