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QUALIFICATION WORK

on the topic: **«STUDY OF FACTORS INFLUENCING ADHERENCE OF PATIENTS WITH TYPE 2 DIABETES»**

Prepared by: higher education graduate of group Фм18(4.10)а-08 specialties 226 Pharmacy, industrial pharmacy

educational program Pharmacy

Yassine ALAOUI ABDALLAOUI

Supervisor: Associate Professor of the Higher Education Institution of the Department of Pharmacology and Pharmacotherapy, PhD, Associate Professor

Nataliia ZHABOTYNSKA

Reviewer: Associate Professor of the Higher Education Institution of the Department of Clinical Laboratory Diagnostics, Doctor of Pharmaceutical Sciences, Associate Professor

Olena DOLZHYKOVA

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ANNOTATION

In the qualification work, the adherence of patients with type 2 diabetes, compliance with modern guidelines for pharmacotherapy of type 2 diabetes were assessed, the level of glucose control, identified factors influencing the level of patient adherence, and possible ways to improve patient compliance were proposed. The qualification work presented on 40 pages, includes 4 tables, 8 figures, 42 literature sources and 2 applications.

Key words: adherence, diabetes mellitus type 2, hypoglycemic therapy, biguanides, sodium-glucose cotransporter inhibitors 2.

АННОТАЦІЯ

У кваліфікаційній роботі було оцінено комплаєнс пацієнтів з цукровим діабетом 2 типу, дотримання сучасних рекомендацій щодо фармакотерапії цукрового діабету 2 типу та рівень контролю перебігу захворювання; виявлено фактори, що впливають на рівень комплаєнсу пацієнтів, запропоновано можливі шляхи поліпшення комплаєнсу пацієнтів. Кваліфікаційна робота викладена на 40 сторінках, включає 4 таблиці, 8 малюнків, 42 джерела літератури та 2 додатки.

Ключові слова: комплаєнс, цукровий діабет 2 типу, гіпоглікемічна терапія, бігуаніди, інгібітори натрій-глюкозного котранспортера 2.

LIST OF CONTENTS

ABBREVIATIONS LIST

AH — arterial hypertension;

BMQ — Breaf Medical Questionnaire;

CHF — chronic heart failure;

CRF — chronic renal failure;

CVC — cardiovascular complications;

CVD — cardiovascular diseases;

CVS — cardiovascular system;

DPP-IV — Dipeptidyl-Peptidase 4 Ingibitors;

GLP-1 — Glucagon-like Peptide-1;

HbA1c — Glycated hemoglobin;

HB-HBP — Hill-Bone Compliance to High Blood Pressure Therapy Scale;

HB-MAS — Morisky Treatment Adherence Scale;

HIV/AIDS — Human immunodeficiency virus/ acquired immunodeficiency syndrome;

IDF — International Diabetes Federation;

IHD — Ischemic Heart Disease;

MMAS — Morisky Medication Adherence Scale;

SD — standard deviations;

SGLT-2 — Sodium-Glucose Transport Protein 2 Inhibitors;

TDM — therapeutic drug monitoring;

TZD — Thiazolidinediones;

WHO — World Health Organization;

INTRODUCTION

Relevance of the topic. Diabetes mellitus is one of the most common diseases in the world. According to the International Diabetes Federation (IDF), the number of diabetic patients in the world will increase to 552 million by 2030, and to 592 million by 2035. The situation is also complicated by the fact that comorbidity with cardiovascular diseases (CVD) are observed in type 2 diabetes: ischemic heart disease (IHD) and arterial hypertension (AH), which lead to high mortality in patients with diabetes mellitus. An obligatory condition for effective pharmacotherapy of patients is the uninterrupted provision of them with hypoglycemic medicines and medical products that allow controlling blood glucose levels.

Despite the presence in the arsenal of doctors of highly effective medicines to decrease level of blood glucose, it is not always possible to effectively control the disease and prevent the development of severe complications of the diabetes, leading to disability in patients. Among the reasons for insufficient glycemic control are low adherence to treatment in patients with type 2 diabetes, the lack of information about possible complications that the disease lead to, an increasing number of medications taken due to the frequent presence of numerous comorbid pathologies in patients with type 2 diabetes, and as well as an increase in the frequency of medicine administration.

Patient's adherence to treatment is a vital factor that can affect blood glucose control. Low adherence to drug treatment leads to a worsening of the course of diabetes, to significant fluctuations in glycemia, an increase in the likelihood of severe complications, primarily acute cerebro- and cardiovascular events, and causes a significant increase in treatment costs.

The research of the adherence of patients with type 2 diabetes and factors that determine it, is a component of an integrated approach to solving the problems of pharmacotherapy for diabetes. The results of the patient adherence assessment can serve as a basis for the development and implementation of programs to

improve adherence to treatment, which will ultimately lead to better control of the diabetes, an improvement in the prognosis of the disease and a reduction in health care costs for the country.

Purpose of the research. Purpose of the research is study the adherence of patients with type 2 diabetes, to determine the factors influencing on it, and to develop practical recommendations for improvement of patient's adherence.

Research objectives:

1. Develop a questionnaire to assess the compliance of patients with type 2 diabetes.

2. Describe patients with type 2 diabetes who participated in the survey.

3. Analyze and evaluate the choice of hypoglycemic medicines with modern domestic recommendations and international guidelines for the choice of drugs for the pharmacotherapy of type 2 diabetes.

4. Identify the degree of control of the course of type 2 diabetes by pharmacotherapy received by patients

5. Determine the adherence of patients with type 2 diabetes.

6. Identify groups of patients with type 2 diabetes with different levels of adherence.

7. Identify the most significant factors that influencing the level of patient's adherence.

8. Suggest possible ways to improve the adherence of patients with type 2 diabetes based on the results obtained.

Object of research. The object of research is type 2 diabetes.

Subject of research. The subject of research is the compliance of patients with type 2 diabetes.

Research methods. During performing the master's thesis, sociological and statistical research methods were used. The research used the "direct question" method, which is widely used to study the compliance of various groups of patients. The basis of this method is to conduct a survey of patients using various

questionnaires. Nonparametric descriptive methods of statistics were used to analyze the obtained data.

Practical significance of the obtained results. The results of the master's thesis made it possible to evaluate the adherence of patients with type 2 diabetes and evaluate its impact on the control of the disease, adherence with modern guidelines on the use of hypoglycemic drugs for the pharmacotherapy of type 2 diabetes, and identify factors influencing the level of patient's adherence. Based on the data obtained, possible ways to improve the adherence of patients with type 2 diabetes were proposed.

Approbation of research results and publication. The results of the study were published in abstracts (Application A):

1. Research of adherence in patients with type 2 diabetes / Alaoui Abdallaoui Yassine, Scientific supervisor Ph.D, associate professor Zhabotynska N.V. // «Актуальні питання створення нових лікарських засобів»: матеріали XXIX Міжнародної науково-практичної конференції молодих вчених та студентів (19-21 квітня 2023 р., м. Харків). – Харків: НФаУ, 2023. – с. 365

Structure and volume of master's thesis. The master's thesis consists of an introduction, 3 chapters: literature review, description of research methods, research results and their analysis; conclusions. The master's thesis is presented on 40 pages, includes 4 tables, 8 figures, 43 sources of literature and 2 appcations.

CHAPTER 1
LITERATURE REVIEW

1.1. Type 2 diabetes prevalence

Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Hyperglycaemia, also called raised blood glucose or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially the nerves and blood vessels.

Diabetes can be classified into the following general categories [1]:

1. Type 1 diabetes (due to autoimmune β-cell destruction, usually leading to absolute insulin deficiency, including latent autoimmune diabetes of adulthood).

2. Type 2 diabetes (due to a progressive loss of adequate β-cell insulin secretion frequently on the background of insulin resistance).

3. Specific types of diabetes due to other causes, e.g., monogenic diabetes syndromes (such as neonatal diabetes and maturity-onset diabetes of the young), diseases of the exocrine pancreas (such as cystic fibrosis and pancreatitis), and drug- or chemical-induced diabetes (such as with glucocorticoid use, in the treatment of HIV/AIDS, or after organ transplantation).

4. Gestational diabetes mellitus (diabetes diagnosed in the second or third trimester of pregnancy that was not clearly overt diabetes prior to gestation).

Type 2 diabetes (formerly called non-insulin-dependent, or adult-onset) results from the body's ineffective use of insulin. More than 95% of people with diabetes have type 2 diabetes. This type of diabetes is largely the result of excess body weight and physical inactivity. The reason for this disturbance of glucose metabolism is associated mainly with insulin resistance and relative insulin deficiency or with a predominant defect in insulin secretion with insulin resistance [1, 2].

The number of people with diabetes rose from 108 million in 1980 to 422 million in 2014. Prevalence has been rising more rapidly in low- and middle-income countries than in high-income countries. In 2014, 8.5% of adults aged 18 years and older had diabetes. In 2019, diabetes was the direct cause of 1.5 million deaths and 48% of all deaths due to diabetes occurred before the age of 70 years. Another 460 000 kidney disease deaths were caused by diabetes, and raised blood glucose causes around 20% of cardiovascular deaths [3]. Between 2000 and 2019, there was a 3% increase in age-standardized mortality rates from diabetes. In lower-middle-income countries, the mortality rate due to diabetes increased 13% [4].

Among patients with diabetes, patients with type 2 diabetes reach 90-95%. However, the number of people with undiagnosed diabetes actually exceeds the number of diagnosed patients by 3–4 times. According to world statistics, every 13-15 years the number of people with diabetes doubles. This mainly concerns the number of patients with type 2 diabetes. The situation is also complicated by the fact that comorbidity with cardiovascular diseases (CVD) is observed in this type of diabetes: coronary heart disease (CHD) and arterial hypertension (AH). At the same time, AH occurs 2 times more often than in patients without diabetes [1, 2]. This is due to the fact that diabetes is the basis for the development of CVD, damage to the nerves, eyes and kidneys. An indispensable condition for the effective treatment of patients is the uninterrupted provision of them with hypoglycemic drugs and medical devices that allow you to control blood glucose levels. These facts testify to the wide prevalence of diabetes in the world. Therefore, all studies related to diabetes are relevant.

Here is the suggested staging model for type 2 diabetes [4]:

Stage 1 — Regulation of blood glucose is impaired and blood glucose is higher than normal. Diabetes complications may be present. Hemoglobin A1c (HbA1c) 5.7-6.5%.

Stage 2 — ability to produce and use insulin is further impaired than Stage 1. Complications are often present, particularly in the circulatory and nervous systems. Metabolic syndrome is common. HbA1c is 6.5-9.0%.

Stage 3 — there are severe diabetic complications including neuropathy, vision loss, foot ulcers, amputation, blindness, kidney disease and heart disease. Hospitalizations may be frequent. HbA1c is above 9.0%.

Stage 4 — extremely high glucose levels is putting patients in danger of organ failure, highest chance of mortality. HbA1c is more than 12% and/or diabetic emergencies.

There are a number of risk factors for developing diabetes, including [1, 2]:

- Are older than 45.
- Have overweight/obesity.
- Don't exercise.
- Had gestational diabetes while pregnant.
- Have a family history of diabetes.
- Have high blood pressure.
- Have prediabetes (higher than normal blood sugar, though not high enough to be type 2 diabetes).

Early identification of risk factors for type 2 diabetes can prevent the development of the disease. To determine the risk factors for the development of diabetes, a special online test has been developed, which is a form of risk assessment for type 2 diabetes. This test consists of questions about a person's age, body mass index, waist circumference, daily physical activity level, family history, dietary habits, and medications taken to treat CVD, specifically AH. Such an evidence-based online test to determine the individual risk of type 2 diabetes is available at https://www.cdc.gov/diabetes/takethetest/. Everyone can take the test, both independently and during an appointment with their family doctor, in order to immediately receive recommendations for appropriate treatment and lifestyle changes based on the result [5].

Early detection of type 2 diabetes in asymptomatic patients allows timely detection of the disease, prevention or delay of complications. To do this, it is necessary to determine the level of glycemia annually in the following groups of patients:

- in patients with prediabetes;

- in patients of any age with overweight or obesity, in patients with moderate, high and very high risk of type 2 diabetes, in all patients over 45 years of age (if glucose levels are within the normal range, retest no later than 3 years);

- it is also desirable to determine the indicator of glycated hemoglobin (HbA1c) and perform an oral glucose tolerance test [1, 2].

1.2. Modern strategies for pharmacotherapy of type 2 diabetes

The modern strategy for the treatment of type 2 diabetes consists of two components: non-drug therapy and pharmacological methods of pharmacotherapy for type 2 diabetes [1, 2].

There is evidence that non-pharmacological treatments for type 2 diabetes improve glycemic control, reduce the risk of CVD, reduce complications and mortality. The main objectives of non-drug treatment of patients with type 2 diabetes are the correction of nutrition and overweight, the patient's performance of dosed physical activity, and lifestyle modification/

General management of diabetic patients consist of education, medical nutrition therapy, and physical activity [6]. Education of patients with either prediabetes or diabetes should include the following content areas that are based on assessed needs:

- disease process;

- treatment option;

- nutritional plan;

- exercise plan;

- knowledge of diabetes medicine prescribed;

- blood glucose monitoring;
- knowledge of acute and chronic complications;
- psychosocial issues;
- individual strategies to promote health.

Medical nutrition therapy means calculation of diet is based on ideal body weight (in pounds) multiplied by 10 to establish a basic kilojoule (kilocalorie) requirement, plus 30% to 100% added for physical activity. The diet should include 50% to 55% carbohydrate, 30% fat (of which no more than 10% should be saturated fatty acids, and 15%–20% protein), as well as fiber. It is important to remember that both portion control in the management of diet and daily exercise play very important roles in maintaining ideal body weight [6].

Sedentary lifestyle is a powerful but modifiable risk factor for type 2 diabetes; therefore, moderate exercise is of utmost benefit in patients with diabetes [6].

Achieving target blood glucose levels through a healthy lifestyle is only achieved in a very small number of people with type 2 diabetes for several months. Medical pharmacotherapy, in addition to non-pharmacological methods, helps to achieve the best control of blood glucose levels and prevents the development of complications of type 2 diabetes.

To date, there are a fairly large number of modern oral hypoglycemic agents for the pharmacotherapy of type 2 diabetes [1, 2, 7, 8, 9], which have a good evidence base for their effectiveness (Table 1.1)

Table 1.1

Oral hypoglycemic agents

Medicine class	International name	Application features
Biguanides	Metformin	Is the drug of first choice ("gold standard"); does not lead to weight gain or hypoglycemia; reduces

		insulin resistance
Sodium-Glucose Transport Protein 2 Inhibitors (SGLT-2)	Dapagliflozin Empagliflozin Canagliflozin	Used as monotherapy in case of intolerance/contraindications to metformin, in patients with concomitant CHF and CRF in combination with other oral hypoglycemic agents
Glucagon-like Peptide-1 Agonists (GLP-1 receptor agonists)	Dulaglutide Albiglutide Liraglutide Semaglutide Exenatide Lixisenatide	The action of these agents is manifested only in conditions of hyperglycemia, which reduces the risk of episodes of hypoglycemia
Dipeptidyl-Peptidase IV Ingibitors (DPP-IV)	Sitagliptin Vildagliptin Saxagliptin	Added to pharmacotherapy when not effective SGLT-2 and GLP-1 receptor agonists
Sulfonylureas	Gliclazide Glimepiride Glipizide	Have a fast action; have a light dosage of drugs with a modified release; disadvantages: weight gain; risk of hypoglycemia
Thiazolidinediones (TZD)	Pioglitazone	The most significant advantage of TZD's is that they do not cause hypoglycemia as monotherapy and are not contraindicated in patients with renal disease

It is necessary to constantly evaluate the effectiveness of pharmacotherapy for type 2 diabetes. If the target level of glycemia is not achieved, you should make sure that the patient follows the recommendations for taking the prescribed drugs.

If the provided drug therapy is ineffective when the patient fulfils all the recommendations, refer him to an institution providing secondary medical care.

1.3. The current state of the study of the problem of adherence of patients with type 2 diabetes

In recent decades, the problem of achieving adherence with pharmacotherapy has become increasingly important. This problem becomes especially acute in the context of the pharmacotherapy of patients with type 2 diabetes, where adherence and accurate fulfilment of medicine prescriptions by patients directly correlate with the degree of compensation for the disease. Violation of diet and exercise, refusal to take hypoglycemic drugs or self-adjustment of their dose will certainly lead to impaired blood glucose levels and somatic complications [10, 11, 12].

Among the reasons for the low level of effectiveness of hypoglycemic therapy, the following are distinguished [13]:

• Inadequate treatment renewal. Many patients continue to receive monotherapy despite poor glycemic control [2];

• Low adherence to treatment [13, 14];

• Insufficient use of combined pharmacotherapy. Type 2 diabetes has a multifactorial pathogenesis, therefore, combinations of hypoglycemic drugs that affect various mechanisms of increasing blood glucose levels are necessary to reduce glycemia in most patients with type 2 diabetes. Thus, monotherapy is likely insufficient for most patients [2, 15];

• Some patients with type 2 diabetes is resistant to pharmacotherapy [13];

• Insufficient perception of information in the communication "doctor-patient", which is determined by the peculiarities of the presentation of information by the doctor and the leading perceiving system of the patient [12];

• Complexity of current treatment strategies of type 2 diabetes.

There is evidence that treatment adherence is adversely affected by the complexity of the prescribed therapeutic regimen. Treatment adherence is strongly influenced by the number of prescribed pills. Non-adherence is typically <10% with one, ≈20% with two, ≈40% with three, and more with ≥ 5 tablets [2, 15]. Complex multi-drug treatment regimens, especially when combined with multiple daily doses, have long been recognized as an obstacle to patient adherence to pharmacotherapy [14].

According to practitioners, the main reason for the lack of achievement of the target blood glucose level in 70% of patients is low adherence to pharmacotherapy [15]. Adherence has medical, social and individual aspects [14]. Even in large clinical trials with their inherent very careful selection of patients and treatment control, the adherence rate is only 43 – 78% [2, 17].

Adherence has been defined as "the extent to which a person's behaviour, taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider" [13]. Adherence to treatment has four main manifestations [18]:

• The patient takes the medicine on time;

• The patient takes it in full dose;

• The patient adheres to dietary and lifestyle recommendations;

• and with all this does not say that he was deprived of the last joy in life.

At present, there is no gold standard method of measuring medication adherence [19]. A number of researchers have suggested that the required minimum adherence to achieve the desired therapeutic effect should be at least 80% [19-21]. Some investigators consider adherence to be good if it is ≥95% (<2 doses out of 30 or <30 doses out of 60 missed). It is bad if it is in the range of 85-94% (missing 3-5 doses out of 30 or 3-9 doses out of 60) [22]. Adherence rates for patients with diabetes range from 65% – 85% for oral hypoglycemic medications and 60% – 80% for insulin [23].

The World Health Organization (WHO) has made a significant contribution to the understanding of adherence by asserting adherence as a multidimensional

phenomenon governed by the interplay of five sets of factors, also known as "dimensions" [24]. These five dimensions include (fig. 1.1):

- socioeconomic factors;
- patient-related factors;
- clinical condition-related factors;
- therapy-related factors;
- healthcare system-related factors.

Figure 1.1 Five dimensions of adherence [24]

The study of the adherence of patients with type 2 diabetes has long attracted the attention of researchers. Alqarni A.M., Alrahbeni T., Qarni A.A. et other [25] in their study showed that the level of adherence to DM medications was suboptimal. Even when free medicines were available with a high level of health care access through government programmes, our study demonstrated poor adherence. Variations were observed between high, intermediate, and low adherence level regarding occupational status, current medication, A1c level, and number of comorbidity. Świątoniowska-Lonc N. with co-authors [26] showed that psychosocial factors are related to medication adherence of patients with type 2 diabetes. The authors, having analyzed 36 literature sources, showed negative

effects of anxiety, diabetes distress, older age, poor communication with physicians, stress, concerns about medicines and cognitive impairment on levels of self-care and medication adherence. One study did not confirm the association of depression with adherence. Self-efficacy, social and family support, and acceptance of illness had a beneficial effect on medication adherence. In conclusion, the current evidence suggests that the relationship between psychosocial factors and adherence has reliable scientific support. According to Alshehri K.A. with co-authors [27] 68.5% of patients with type 2 diabetes — participants in the study — reported adherence to taking hypoglycemic drugs, and 31.5% were not compliant. The most common reason for non-adherence was "forgetfulness" about the need to take medications. Non-adherence to pharmacotherapy is associated with poor outcomes and lower quality of life. In a study by Aminde L.N. et al. [28] reported a non-adherence rate of 54.4%. The main factors influencing non-compliance with the regimen, patients indicated their forgetfulness, lack of finances for the purchase of drugs and the disappearance and/ or reduction of symptoms of the disease on the background of pharmacotherapy. In their study, Huber C.A., Reich O. [29] showed no difference in adherence to the treatment regimen by patients with type 2 diabetes, depending on the method of obtaining hypoglycemic medicine: directly from the attending physician or through a pharmacy. At the same time, adherence with treatment was poor in all groups of patients and amounted to about 40%. The following factors were found to provide a higher level of adherence: older age groups, male sex, the presence of comorbid diseases, and combination drug therapy for diabetes. Based on the results of the study, recommendations were made to doctors and pharmacists on the need to develop and implement useful tools to improve the adherence of patients with diabetes to pharmacotherapy. Rawnaq Adil Aladhaba, Majid Hameed Alabbood [30] showed a low level of adherence in patients despite sufficient awareness of patients about the importance of adherence to therapy, exercise and diet in the prevention of severe type 2 diabetes and the development of catastrophic complications from the CVD.

Conclusions to chapter 1

Despite a fairly wide study of the adherence of patients with type 2 diabetes; the identification of various factors influencing its level, today there are not enough effective mechanisms for improving patient adherence. Therefore, there is a need for further study of various aspects of the adherence of patients with type 2 diabetes in order to develop further modern methods for improving patient's adherence and, as a result, improving the control of the course of type 2 diabetes.

CHAPTER 2
RESEARCH METHODS

An objective research of adherence in patients with diabetes is rather difficult. According to the literature, there are several methods for measuring patient's adherence to treatment [19, 31]:

- Self-report questionnaires or structured interviews. Self-report questionnaires are considered a convenient, indirect and efficient method to measure adherence among patients. The biggest advantages of using questionnaires are their easy applicability in the clinical practice and low cost. However, questionnaires might be subject to recall and response bias which might decrease their accuracy and validity [32].

- Therapeutic drug monitoring (TDM) comprises measurement of drug concentrations in body fluids, often serum and plasma, of an individual patient. TDM is more often used as a tailored drug management tool to adjust doses in the optimal target range, than as a method to monitor drug adherence. However, TDM is the only direct objective measure of medication adherence and has thus been used for this purpose in scientific research, for example, in the therapeutic management of HIV-infected children [33].

- Pharmacy pick-up/refill rates. Pharmacy data may serve as a source for the calculation of pick-up rates and refill rates. Pick-up rates describe the number of picked-up prescriptions as a percent of the total prescribed doses. Refill rates are defined as the division of the amount of days the drugs have been prescribed by the total calendar days of that period [34].

- Electronic medication monitoring. The invention of electronic monitors to assess adherence has been a valuable addition to the existing paediatric adherence measurement methods. Electronic adherence measurement devices have been even regarded as the "gold standard" of adherence measurement [35].

As we can see, the most convenient and promising way to assess adherence to treatment, both in scientific research and in real clinical practice, is to question

patients using various questionnaires and scales. WHO experts believe that the different scales and questionnaires make it possible to identify more than 50% of non-adherence patients. Their specificity is about 84% [24].

Currently, there are many different questionnaires and scales [32]. All of them are indirect methods of measuring adherence; they have a certain degree of subjectivity. At the same time, the available literature lacks standardized scales for assessing the compliance of patients with diabetes, which could allow the doctor to assess the level of patient adherence to treatment.

The most commonly used in research is the validated Morisky-Green compliance scale, created by Morisky D.E., Green L.W., Levine D.M. in 1985 and published in 1986. This scale is designed to assess the degree of medical adherence of patients with chronic diseases and consists of four test questions, evaluated on a yes-no basis; "yes" answer was scored 0 points, "no" answer — 1 point [36]. In this case, both 4- and 8-question versions of the Morisky scale are used — Morisky Medication Adherence Scale (MMAS-4 and MMAS-8). However, the number of questions on this scale is not enough to obtain complete information about how medical prescriptions are carried out by patients with diabetes.

A universal scale that allows measuring adherence to taking specific drugs, as well as assessing the potential and actual causes of non-adherence, is a Brief Medication Questionnaire (BMQ) [37]. It should be noted that this is one of the few tests that allows you to determine not only omissions in taking medications, but also their excessive use, i.e. adherence >100%, which is also considered unsatisfactory. This questionnaire is validated for patients not only with AH, but also with diabetes, depression and other chronic diseases [38].

Quite popular is the Hill-Bone Compliance to High Blood Pressure Therapy Scale (HB-HBP). This scale was created specifically for patients with AH, therefore, it has the highest validity in assessing adherence in patients with AH [39]. The Hill-Bone Compliance to High Blood Pressure Therapy Scale assesses patient behaviours for three important behavioural domains of high blood pressure treatment:

- reduced sodium intake;

- appointment keeping;

- medication taking.

This scale is comprised of 14 items in three subscales. Such a set of questions allows assessing the impact on patient compliance not only of the regimen of prescribed antihypertensive drugs, but also of the patient's communication with the doctor, as well as compliance with individual recommendations related to the modification of the patient's lifestyle. Patient responses in the HB-HBP scale are compiled according to the Likert's rating scale, in which the respondent indicates the degree of their agreement or disagreement with the statements regarding the object under study, using a scale that usually contains five to seven categories and indicates the frequency of the statements given in the questions: "never"; "rarely", "sometimes", "always" [39]. Scores on the HB-HBP scale and subscales are calculated by summing the individual items. Each answer is estimated at a certain number of points: "always" —1 point, "almost always" — 2 points; "sometimes" — 3 points; "never" — 4 points [40].

For patients with other diseases, it is possible to use only 9 questions of the first subscale of the test, containing questions about drug adherence, then this scale is called the Hill-Bone Medication Adherence Scale (HB-MAS). This scale was taken as the basis of our questionnaire. To obtain the original scale and instructions for its correct assessment, we registered on a website [41].

In our research, an anonymous questionnaire was created to assess the adherence of patients with type 2 diabetes, which consisted of several parts.

Part I — general part, in which patients indicated gender, age, education and marital status.

Part II — anamnesis of the disease. In this part of the questionnaire, patients answered questions regarding the characteristics of the course of the disease, the presence of comorbid pathology and complications:

1. What chronic disease do you suffer from (other than type 2 diabetes)?

2. How long have you been over type 2 diabetes?

3. Which of the following diseases did you have?

4. How do you assess your condition against the background of the prescribed treatment?

5. In the last 12 months, how many times have you been treated in the hospital (hospital) for an exacerbation of your illness?

Part III of the questionnaire consisted directly of the HB-MAS scale. To assess the intake of hypoglycemic drugs, 8 questions were asked.

Part IV of the questionnaire consisted of questions indicating the possible participation of patients in the drug reimbursement program.

Part V of the questionnaire consisted of questions evaluating the pharmacotherapy received by patients with type 2 diabetes, as well as glycemic control and compensation for type 2 diabetes.

During the research, we interviewed 72 randomly selected patients with type 2 diabetes who visit a pharmacy to purchase hypoglycemic drugs. The inclusion criteria for the study were as follows:

• Consent to participate in the study;

•Age elders than 18 years;

• Diagnosis of type 2 diabetes.

• Receiving hypoglycemic pharmacotherapy.

The exclusion criteria were the following:

• Inability to communicate due to physical or mental problems;

• Pregnant female.

The obtained data were analyzed using non-parametric descriptive methods of statistics using Microsoft Excel programs from the Microsoft Office package of office programs and the STATISTICA 5.0 program. Descriptive statistics, such as frequency distributions and means, were used to assess personal characteristics, age, and patient compliance variables. Statistical characteristics of the variables were presented using percentages, average (M) ± standard deviations (SD). To

confirm the proposed hypothesis, a correlation analysis was carried out. The significance level was set at (p ≤ 0.05) for all statistical procedures.

Conclusions to the chapter 2

Thus, in the qualifying work, the questionnaire method was used, the HB-MAS scale was used to measure adherence, and the analysis of the data obtained was carried out using statistical methods.

CHAPTER 3
THE RESULTS OF THE RESEARCH. THE DISCUSSION OF THE RESULTS

3.1. Characteristics in patients with type 2 diabetes who took part in the research

The research included 72 patients: 37 female and 35 male aged 23 to 90 years (mean age was 63.70 ± 15.71 years). All participants were distributed according to the WHO age classification [42] (Fig.3.1.).
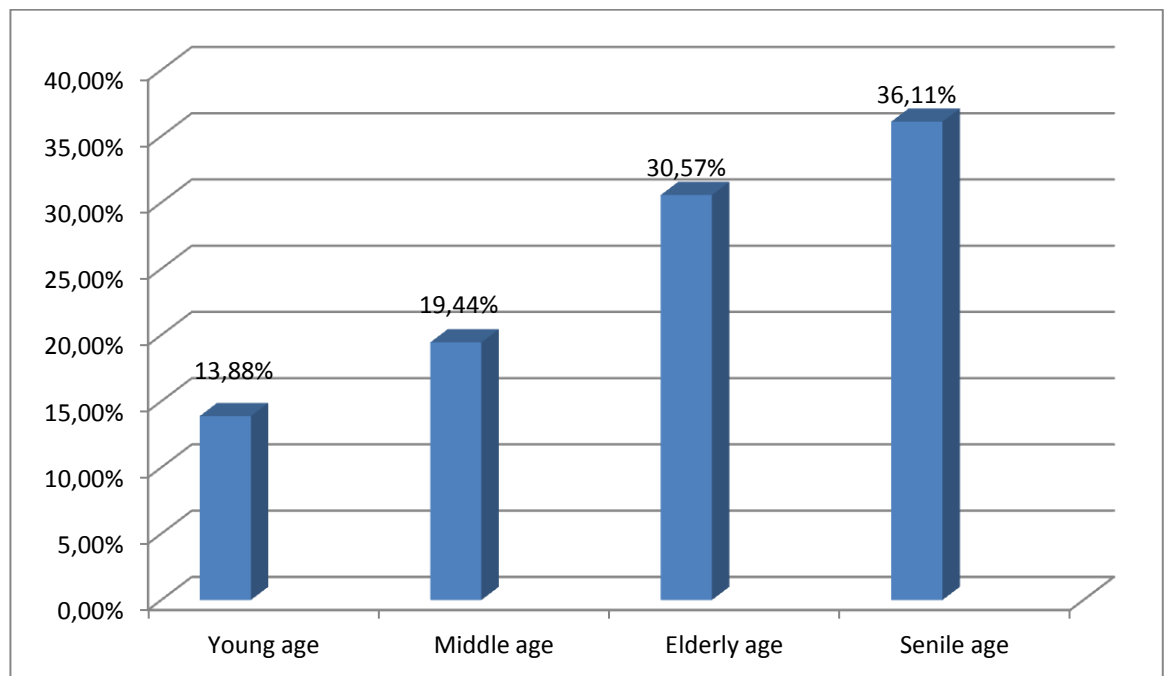

Fig. 3.1 Distribution of patients with type 2 diabetes according to the WHO age classification

Long-livers were not included in the study. At the same time, the prevalence of type 2 diabetes in people of working age (25 (34.7%) patients under 60 years old) was 1.88 times lower than the average compared to people of retirement age (47 (65.27%) people over 60 years old). This prevalence of type 2 diabetes depending on the gender and age of patients generally corresponds to the literature data.

An analysis of the distribution of patients with type 2 diabetes, depending on the nature of their education, showed that 19 (26.38%) people had higher education, 28 (38.88%) people had specialized secondary education, and 25 (37.74%) people had secondary education. At the same time, there were 1.1 times more women with higher education, and 1.08 times fewer female with secondary education than male. There were equal numbers of people with secondary specialized education among male and female.

The distribution of patients with type 2 diabetes by marital status was also analyzed. Among the respondents, 56 (77.77%) married persons, 6 (8.33%) unmarried and 10 (13.9%) divorced persons were identified.

The duration of type 2 diabetes disease ranged from 6 months up to 18 years old. At the same time, the duration of the disease up to 1 year was observed in 2 patients (2.77%); from 1 to 5 years — in 5 patients (6.94%); from 5 to 10 years — in 20 patients (27.77%); from 10 to 15 years — in 29 patients (40.27%); more than 15 years — in 16 patients (22.25%). Based on the data obtained, the majority of patients suffered from type 2 diabetes for more than 5 years (from 5 to 15 years) (Fig. 3.2).
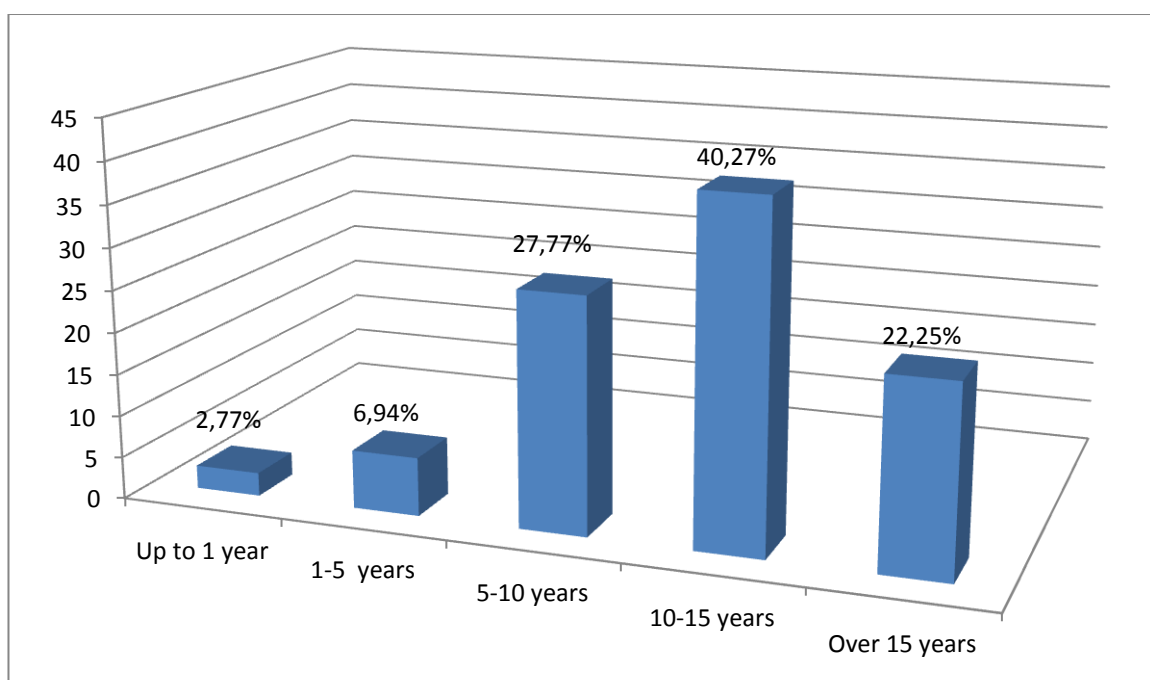

Fig. 3.2 The duration of disease

Thus, the patients who participated in the research were comparable in gender, age (more than 66% were elderly and senile age people), the vast majority were married (more than 77%), and the prevailing duration of the disease was from 5 to 15 years. It should also be noted that among the patients surveyed, people with secondary and secondary specialized education predominated. Such characteristics of the patients in the study correspond to the literature data on the age, gender, and social characteristics of patients with type 2 diabetes.

When assessing the presence of concomitant pathology in patients (table 3.1), it was found that 33 (45.83%) patients had no concomitant pathology, and 39 (54.16%) patients had comorbidity diseases. At the same time, 1 comorbidity disease was detected in 28 (38.88%) patients, 2 comorbidity diseases — in 14 (19.44%) patients, 3 comorbidity diseases — in 8 (5.55%) patients.

Table 3.1.

Comorbidity in patients with type 2 diabetes

Comorbidity	Number of patients	
	n	%
AH	16	22,22
IHD	14	19,44
Past Stroke	21	29,16
Past Myocardial infarction	21	29,16
Chronic Kidney Disease	5	6,94

n — absolute number of patients

It should be noted that 14 patients (19.44%) also had myocardial infarction and stroke. We see that the vast majority (almost 55%) of patients had a comorbidity, represented mainly by CVD, namely AH and/or IHD. At the same time, up to 40% of patients with type 2 diabetes had cardiovascular complications in the form of myocardial infarctions and strokes, and almost 20% suffered both of

these diseases. These results indicate a severe, uncompensated course of type 2 diabetes in the patients surveyed.

All interviewed patients rated their health according to the criteria "good", "satisfactory", "partially satisfactory" and "not satisfactory" (Fig. 3.3).
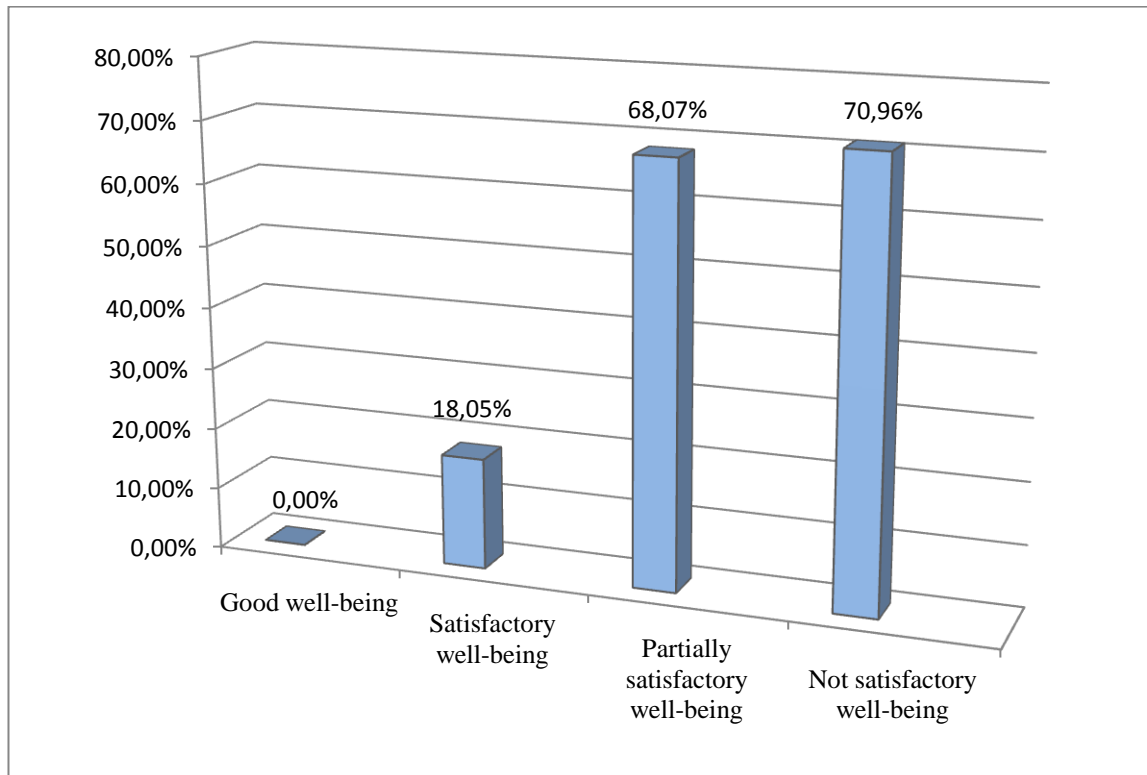

Fig. 3.3 Assessment of well-being in patients with type 2 diabetes

As can be seen from the results obtained, the vast majority of patients (almost 70%) are not satisfied well-being. It is noteworthy that not a single patient rated his well-being as good. This indicates the insufficient effectiveness of the pharmacotherapy obtained, but the causes of this phenomenon require a more detailed study.

The data obtained on the unsatisfactory well-being of patients with type 2 diabetes necessitated the assessment of self-monitoring of patients for blood glucose levels. Among the interviewed patients, it was found that 65 (90.27%) patients regularly measure their blood glucose levels using an individual

glucometer. 7 (9.72%) patients do not control blood glucose levels at all. The frequency of blood glucose control is shown in fig. 3.4
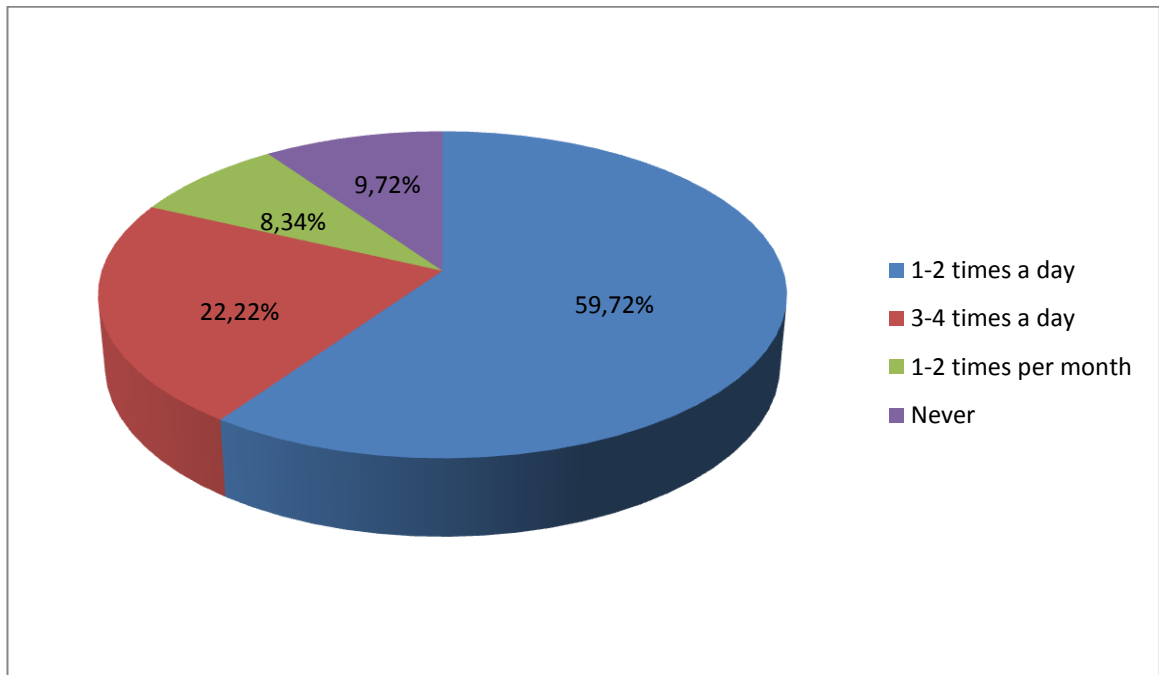

Fig. 3.4 Frequency of blood glucose monitoring

patients with type 2 diabetes

One of the most important indicators for monitoring the effectiveness pharmacotherapy of type 2 diabetes is the level of glycated hemoglobin, a chemical compound of hemoglobin with glucose. This indicator reflects the average blood glucose level over a period of 2-3 months, in contrast to the blood glucose measurement, which gives an idea of the blood glucose level only at the time of the test. Among patients with type 2 diabetes who participated in the study, only 13 (18.05%) patients are known of this indicator and regularly monitor the level of glycated hemoglobin. However, only 6 (46.15%) of these patients had a normal level of glycated hemoglobin (< 6 mmol/l); 7 (53.85%) patients had a glycated hemoglobin level of up to 9 mmol/l, which corresponds to the moderate severity of type 2 diabetes.

Thus, despite the high level of individual control of blood glucose, objective control of type 2 diabetes and the effectiveness of pharmacotherapy is insufficient,

which, most likely, causes unsatisfactory well-being of patients and the presence of severe complications from various organs and systems.

Also, patients participating in the study answered the question about the number of hospitalizations in the last 12 months (Fig. 3.5).
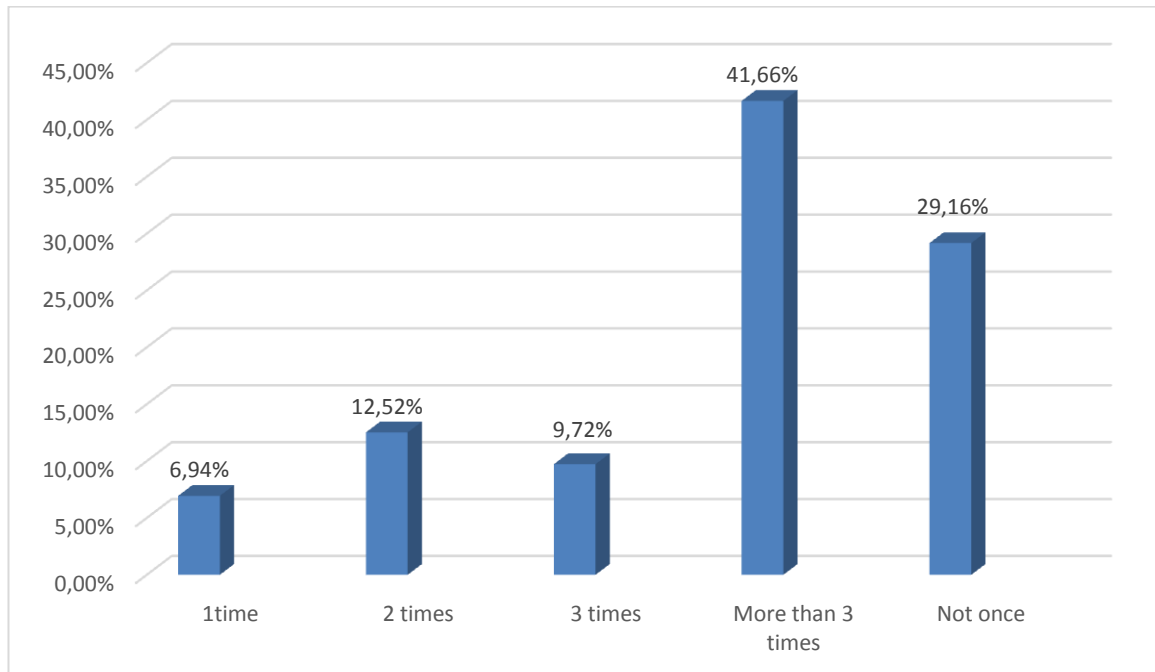

Fig. 3.5 The number of hospitalizations in the last 12 months

Analyzing the obtained data, we can conclude that the vast majority of the surveyed patients with type 2 diabetes (more than 40%) needed inpatient treatment over the past 12 months. In addition, we have identified a significant weak negative correlation (r = - 0.14; p<0.05) between patients' assessment of their own well-being and the number of hospitalizations over the past 12 months. These results indicate insufficient compensation for type 2 diabetes by those drugs that were received by patients who participated in our study.

Thus, among the patients who participated in the study, more than 70% are not satisfied with their well-being, while more than 40% of patients with type 2 diabetes required inpatient treatment over the past 12 months. Such data indicate insufficient compensation for type 2 diabetes by those hypoglycemic drugs that patients received in the study. Our data are comparable with literature data on

insufficient control of the course of type 2 diabetes requires studying the causes of this situation and developing methods for its correction.

3.2. Hypoglycemic pharmacotherapy received by patients with type 2 diabetes

After analyzing the regimens of hypoglycemic pharmacotherapy patients with type 2 diabetes received, it was found that 54 (75%) patients received monotherapy, and 18 (25%) patients received combination therapy. The combination therapy consisted of two drugs from different groups. Options for combined hypoglycemic therapy, which is currently preferred for glycemic control in patients with type 2 diabetes, are presented in Table 3.2.

Table 3.2

Characteristics of combined hypoglycemic therapy

Classes of hypoglycemic drugs	Number of patients with type 2 diabetes	The most common drug combinations
Biguanides + Sulphonylureas	8 (11,11%)	Metformin + Gliclazide
Biguanides + SGLT-2	6 (8,33%)	Metformin + Empagliflozin

When analyzing the choice of drugs for hypoglycemic therapy, it was found that the following classes of drugs were mainly used for pharmacotherapy: biguanides in 46 patients (63.88%); sulphonylureas — in 20 patients (27.77%); SGLT-2 — in 6 patients (8.35%) (Fig. 3.6). All these groups of hypoglycemic drugs have a high evidence base and are included in all Ukrainian and international clinical guidelines for the pharmacotherapy of type 2 diabetes.
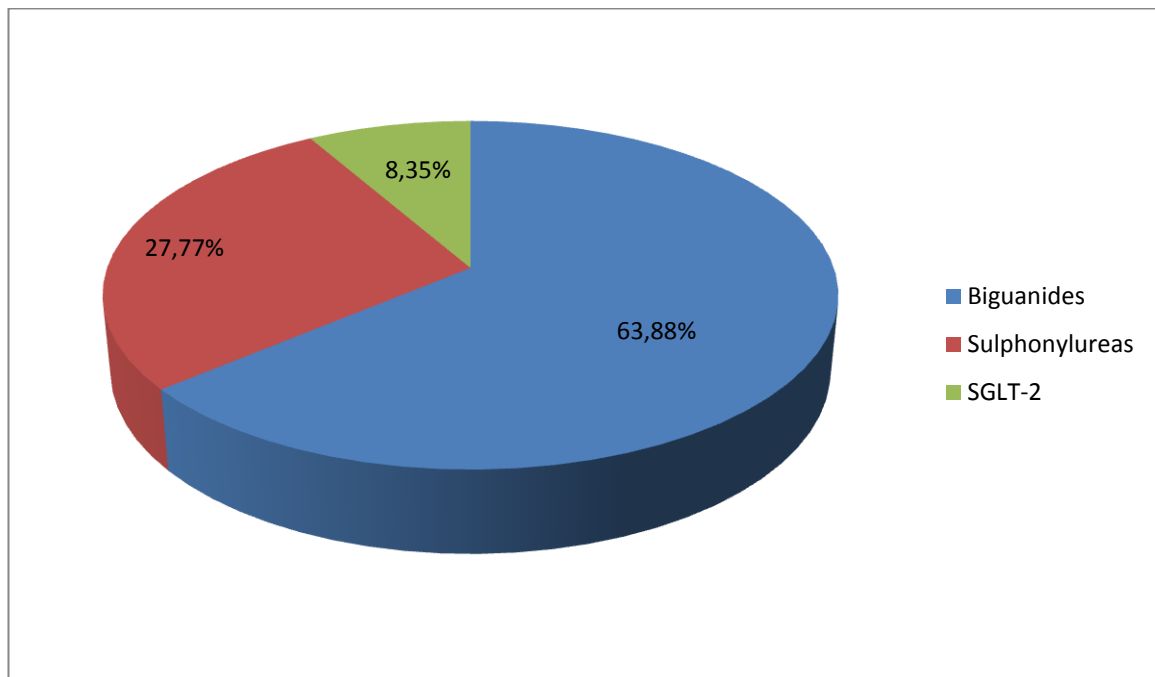
Fig. 3.6 Analysis of drug classes for hypoglycemic therapy

An analysis of the choice of classes of drugs for hypoglycemic pharmacotherapy showed that the leading position among hypoglycemic drugs for both monotherapy and combined pharmacotherapy is occupied by the group of biguanides, which is the "gold standard" of type 2 diabetes pharmacotherapy. This choice of drugs is consistent with modern protocols for the pharmacotherapy of type 2 diabetes. At the same time, biguanides with sulphonylureas or SGLT-2 were mainly used for combination therapy with two drugs.

It should be noted that all hypoglycemic drugs that patients received in the study correspond to modern recommendations for the choice of drugs for pharmacotherapy of type 2 diabetes, set out in international guidelines for the provision of medical care for type 2 diabetes. The predominant use of drugs from the biguanide class (metformin), both in monotherapy and in combination therapy, is in line with current recommendations with level IA evidence for the use of hypoglycemic drugs. Attention is drawn to the use by patients with type 2 diabetes of a modern group of drugs — SGLT-2, which are recommended for the treatment of patients with type 2 diabetes with comorbide CHF. It should be noted that patients with type 2 diabetes who participated in the study did not use other

modern highly effective groups of hypoglycemic drugs, such as GLP-1 reseptors agonists, DPP-4 inhibitors, TZD. This may be due to the high cost and parenteral route of administration (for GLP-1 reseptors agonists) of these drugs.

3.3. Assessing the adherence of patients with type 2 diabetes

When analyzing the results of a survey of patients using the HB-MAS scale, it was found that the degree of adherence in patients with type 2 diabetes was 41.66%. The adherence of patients with type 2 diabetes established during the study is much lower than the level of 80% discussed in the literature. Descriptive statistics of the HB-MAS scale in all studied patients are presented in Table 3.3.

Table 3.3

Results of a survey of patients with type 2 diabetes on the HB-MAS scale

Question number	M ± SD	Always (%)	Almost always (%)	Sometimes (%)	Never (%)
1.	3,13±0,52	7,14	14,28	31,25	61,61
2.	3,5±0,7	0	9,82	30,35	59,82
3.	3,36±1,06	0	13,33	29,16	57,92
4.	3,02±1,11	0	23,21	26,78	50
5.	2,76±0,96	9,82	27,69	38,39	48,24
6.	3,32±0,69	0	16,07	35,71	48,21
7.	3,81±0,41	0	0	19,64	41,86
8.	3,33±0,71	7,14	7,14	49,11	43,76

In general, according to the level of compliance, all patients can be divided into 4 categories: highly adherent (40.88±3.69), partially adherent (36.87±3.9), not fully adherent (25.78±2.5) and not adherent patients (16.67±2.91). The quantitative characteristics of the identified categories of patients with type 2 diabetes are shown in Figure 3.7. As you can see, more than 33% were partially adherent

patients, which indicate the need for various measures to improve adherence. Such work by both doctors and pharmacists can lead to an increase in the adherence of patients with type 2 diabetes to almost 75%.
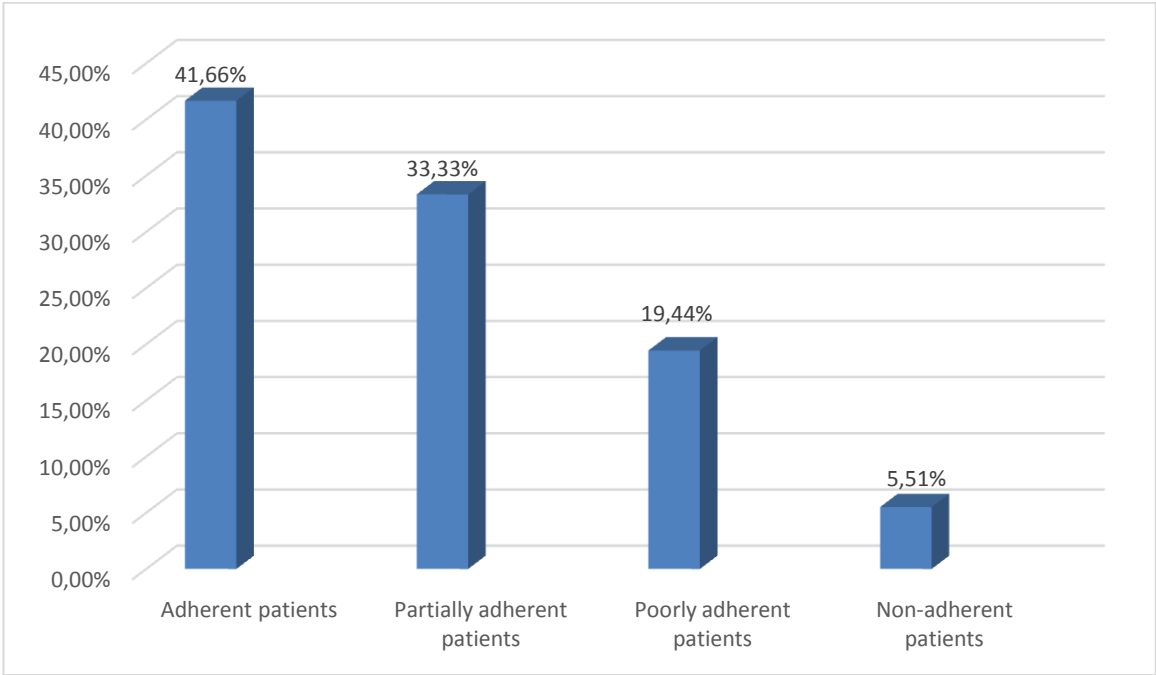

Fig. 3.7 Adherence of patients with type 2 diabetes

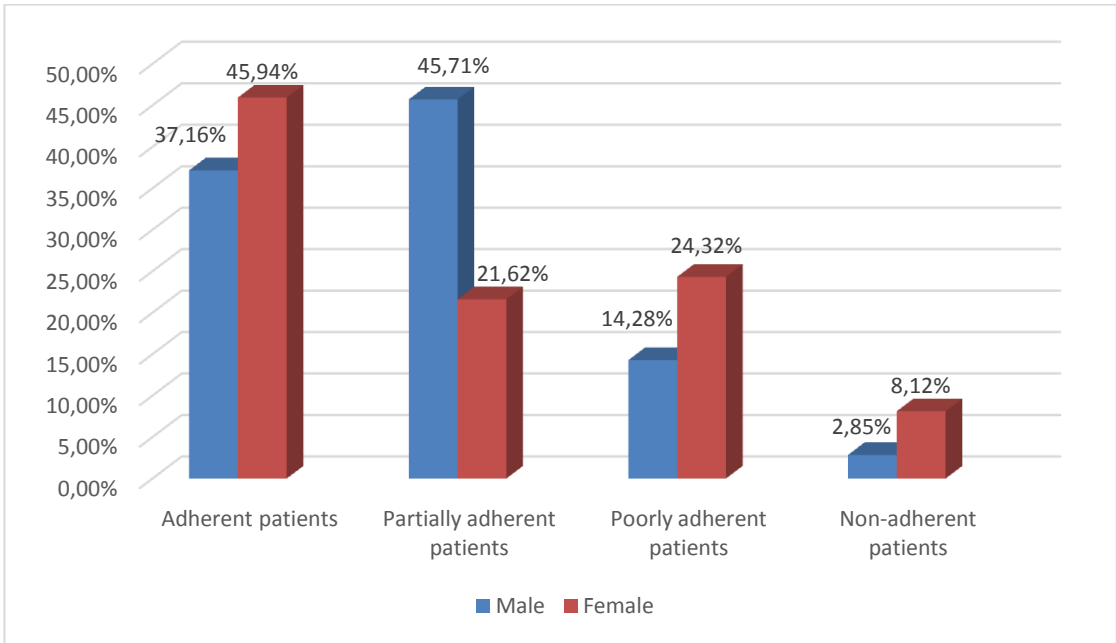The adherence of patients with type 2 diabetes depending on gender was also analyzed (Fig.3.8).

Fig. 3.8 Adherence of patients with type 2 diabetes depending on gender

The data obtained demonstrate that partially adherent patients predominated among male, and female predominated in all other categories (adherent, poorly and non-adherent patients). The study revealed a significant ($p \leq 0.05$) difference in adherence with type 2 diabetes pharmacotherapy between male and female: female patients were 1.23 times more adherent to diabetes treatment than male patients. This is consistent with the results of other adherence studies in patients with type 2 diabetes, which found that the rate of adherence was significantly lower in male patients.

An analysis was made of the dependence of adherence on the age of patients with type 2 diabetes. Among elderly and senile patients (over 60 years old), only 38.95% were adherent with hypoglycemic therapy, which is significantly ($p \leq 0.05$) lower by 6.5% than in the total cohort of patients surveyed. At the same time, the level of their adherence was also found to be lower than in other patients with type 2 diabetes. A weak negative significant correlation was also established ($r = -0.25$; $p \leq 0.05$) between adherence and age of patients with type 2 diabetes.

Also, a weak negative significant correlation was revealed ($r = -0.21$; $p \leq 0.05$) between adherence and education in patients with type 2 diabetes. Patients with higher education had a higher level of adherence with the pharmacotherapy of type 2 diabetes. Getting higher education by patients provides a deeper understanding of the need to treat diabetes in order to prevent its complications and, as a result, greater acceptance of pharmacotherapy of type 2 diabetes.

An interesting direct positive significant correlation ($r = 0.12$; $p \leq 0.05$) was revealed between adherence and the subjective well-being of patients with type 2 diabetes. Such dependence shows the relationship between patients' well-being and their adherence to pharmacotherapy of type 2 diabetes. This is explained by the fact that the regular intake of hypoglycemic drugs allows you to effectively control the level of blood glucose and, thus, prevents the development of complicated diabetes of various organs and systems.

During the study, a direct positive significant correlation was established ($r = 0.11$; $p \leq 0.05$) between adherence and the duration of the disease in patients

with type 2 diabetes. This result indicates a higher level of adherence in patients with a longer course of the disease. Most likely, this is due to the fact that with a longer course of the disease, patients are better informed about the need to control blood glucose levels and prevent the development of complications.

In order to reduce the financial burden on patients, they can take part in reimbursement programs. According to the results of the survey, patients were divided into two groups depending on whether they participate in reimbursement programs: Group I consisted of 58 (80.55%) patients receiving reimbursement; Group II included 14 (19.45%) patients who did not benefit from this program. The adherence of patients in both groups was assessed. It was found that the adherence of patients participating in the reimbursement program was almost 36.02%, and for patients not enjoying the benefits of the program — almost 57.14%. Among the patients of both groups, 2 patients were identified with a complete lack of adherence, which amounted to about 3.44% and 14.28%, respectively. Attention is drawn to the overall low level of adherence of both patients receiving medicines free of charge under the reimbursement program, and in patients who independently purchase medicines in a pharmacy.

Thus, it was found that participation in reimbursement programs does not significantly affect the adherence of patients with type 2 diabetes. This conclusion is also supported by the weak negative significant correlation (r = -0.05; p<0.05) between the participation of patients in the reimbursement program and the level of their adherence that we have identified. The results obtained indicate that in the vast majority of patients, reimbursement programs do not affect their decision to strictly comply with doctor's prescriptions. It was revealed that more than 65% of patients are dissatisfied with the results of participation in the program, and the main reason for this is the need to pay extra for some medicines (more than 43% of patients).

Considering that more than half of patients with type 2 diabetes (54.16%) who participated in the study had from 1 to 3 comorbidity, more often of CVS, it was decided to study the dependence of patients' compliance on the presence of

comorbidity. A negative significant correlation was obtained ($r = -0.16$; $p \leq 0.05$) between adherence and the presence of comorbidity in them. This result is most likely due to the fact that patients with comorbidity are forced to take a sufficiently large number of drugs. This assumption is based on literature data that one of the factors affecting patient adherence is the number of drugs taken: the more of them, the lower the adherence. Therefore, today the combination therapy strategy is relevant, especially with the use of fixed-dose combination.

Thus, the obtained results of studying the adherence of patients to hypoglycemic therapy indicate its rather low level, since the adherence of patients with type 2 diabetes was significantly lower than the minimum of 80% proposed by a number of researchers. However, it should be noted that there is a rather low percentage of non-adherent patients (about 5%) to hypoglycemic therapy, which indicates a global understanding of patients with type 2 diabetes of the need to control blood glucose levels to prevent the development of fatal complications of diabetes, especially from the CVS.

It should be noted that among elderly and senile patients, adherence was significantly ($p \leq 0.05$) lower than in the general cohort of patients surveyed. In addition, significantly lower adherence was observed in male patients, which is consistent with the results of other adherence studies in patients with type 2 diabetes.

At the same time, it was found that the presence of higher education in patients provides a deeper understanding of the need to treat type 2 diabetes in order to prevent its complications and, as a result, a better perception of the pharmacotherapy of type 2 diabetes.

The revealed weak positive significant correlation ($r = 0.12$; $p \leq 0.05$) between adherence and the subjective assessment of the well-being of patients with type 2 diabetes suggests that regular intake of hypoglycemic drugs can effectively control blood glucose levels and, thus, improve their well-being.

The established weak positive significant correlation ($r = 0.11$; $p \leq 0.05$) between adherence and the duration of the disease in patients with type 2 diabetes

indicates their better awareness of the course of the disease, the need to control blood sugar levels and prevent the development of complications.

However, a weak negative significant correlation ($r = -0.16$; $p \leq 0.05$) between compliance and the presence of a comorbidity in patients with type 2 diabetes suggests that taking a large number of drugs for the pharmacotherapy of various diseases has a negative impact on patient's level adherence. It should also be noted that the participation of patients in the type 2 diabetes reimbursement program does not have a significant impact on the level of their adherence.

Conclusions to chapter 3.

The data obtained in the study on the adherence of patients with type 2 diabetes indicate its rather low level, and in elderly patients, senile patients and male patients, the level of adherence was lower than in other patients with type 2 diabetes.

The majority of patients showed unsatisfactory health against the background of a high level of individual blood glucose control and insufficient objective control for type 2 diabetes and the effectiveness of pharmacotherapy by examining the level of glycated hemoglobin. At the same time, adherence directly affects the well-being of patients and depends on the duration of their illness.

The comorbidity has a negative impact on the level of adherence of patients with type 2 diabetes. It was also found that the way patients receive hypoglycemic drugs does not have a significant impact on their adherence.

It should be noted that the hypoglycemic drugs that patients received in the study correspond to modern recommendations for the choice of drugs for pharmacotherapy of type 2 diabetes, but there is an insufficient use of such modern highly effective groups of hypoglycemic drugs such as GLP-1 receptors antagonists, DPP-4 inhibitors, TZD.

The data obtained in the study suggest that one of the possible ways to improve the adherence of patients with type 2 diabetes is to improve the interaction between doctors, pharmacists and patients in order to increase patients' awareness

of the course of type 2 diabetes and recommended drugs to prevent complications and improve blood sugar control.

CONCLUSIONS

1. A questionnaire was developed to assess the adherence of patients with type 2 diabetes.

2. The study involved patients with type 2 diabetes, whose average age was 63.70 ± 15.71 years (more than 66% were elderly and senile people), matched by sex, the vast majority were married (more than 77%) with a disease duration of 5 to 15 years. Among the interviewed patients, people with secondary and secondary specialized education predominated.

3. More than 63% of patients with type 2 diabetes received the biguanide group as hypoglycemic monotherapy, which is the "gold standard" of type 2 diabetes pharmacotherapy and fully complies with international recommendations. At the same time, combinations of biguanides with sulphonylureas or SGLT-2 were mainly used for combination therapy. There is an insufficient use of such groups of hypoglycemic drugs as GLP-1 receptors antagonists, DPP-4 inhibitors, TZD.

4. Most patients report unsatisfactory well-being against the background of a high level of individual blood glucose control and insufficient objective control of compensation for type 2 diabetes and the effectiveness of pharmacotherapy by examining the level of glycated hemoglobin.

5. Adherence of patients with type 2 diabetes was 41.66%, which is almost two times lower than the level of 80% discussed in the literature. At the same time, female patients were 1.23 times more adherent to diabetes treatment than male patients.

6. Among the interviewed patients, more than 41% were highly adherent, more than 33% were partially adherent, more than 19% were insufficiently adherent t, and more than 5% were completely non-adherent. Thus, about 74% of patients with type 2 diabetes have a fairly high level of adherence.

7. When analyzing the relationship between the adherence of patients with type 2 diabetes with various factors, the following was established: a weak

negative significant correlation between adherence and age, education, and subjective assessment of well-being; weak direct positive significant correlation between adherence and subjective assessment of well-being, and the duration of the disease in patients with type 2 diabetes.

8. One of the possible ways to improve the adherence of patients with type 2 diabetes is to improve the interaction between doctors, pharmacists and patients in order to increase patient awareness of the course of type 2 diabetes and recommended drugs to prevent complications and improve blood sugar control.

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APPLICATIONS

препаратами. Так, 43% опитувальних вважають, що одночасне застосування іАПФ з калійзберігаючими діуретиками є раціональним та безпечним, що є неправильною відповіддю, оскільки це може призвести до посилення побічних ефектів та спричинити гіперкаліємію.

Висновки. Таким чином, проведений аналіз анкетування фармацевтів щодо раціонального та безпечного застосування іАПФ для лікування ХСН довів, що незважаючи на поінформованість фармацевтів щодо препаратів даної групи та механізму дії, залишаються певні питання (протипоказання, побічна дія, взаємодія з іншими ліками), що потребують поглиблення знань фармацевтів, що в подальшому дозволить підвищити якість надання фармацевтичної допомоги хворим на ХСН.

RESEARCH OF ADHERENCE IN PATIENTS WITH TYPE 2 DIABETES

Alaoui Abdallaoui Yassine
Scientific supervisor: Zhabotynska N.V.
National University of Pharmacy, Kharkiv, Ukraine
yassinealaoui@gmail.com

Introduction. In recent years, the problem of controlling type 2 diabetes has become increasingly important. One of the possible reasons for insufficient control is the unsatisfactory adherence of patients with type 2 diabetes. The problem of adherence is especially acute in the context of the treatment of patients with type 2 diabetes, where adherence with treatment and the exact fulfillment of medication prescriptions by patients directly correlate with the degree of compensation for the disease. The study of patient adherence may be useful in the search and development of new mechanisms for improving the control of the type 2 diabetes.

Aim. The purpose of the research was to study adherence in different categories of patients with type 2 diabetes.

Materials and methods. The study included 72 patients: 37 female and 35 male aged 23 to 90 years (average 15.71 years). All patients completed the questionnaire. The questionnaire was created on the basis of the Hill-Bone Scales questionnaire modified by the Medication Adherence Scale, adapted for patients with type 2 diabetes. The questionnaire included questions regarding the history of the disease and the pharmacotherapy that patients received, as well as questions regarding the relationship between the doctor and the patient.

Results and discussion. Analysis of the results showed that the degree of adherence of patients with type 2 diabetes was 41.66%. At the same time, 41.66% of patients were fully adherence, 33.33% were partially adherence, 19.44% were insufficiently adherence, and 5.51% were not adherence. An analysis of the adherence of patients with type 2 diabetes depending on gender showed that partially adherence patients predominated among male. At the same time, female was more adherence 1.23 times than male. Adherence analysis depending on age showed that among patients with type 2 diabetes older than 70 years; only 38.95% were adherent to hypoglycemic pharmacotherapy, which is 6.5% lower than in the total cohort of patients surveyed.

Conclusions. Thus, the adherence of patients with type 2 diabetes established during the study is much lower than the level of 80% discussed in the literature. The predominance of partially adherent patients by 1.3 times indicates that the use of methods to increase adherence can contribute to its increase to almost 75%. The results of the study show that special attention should be paid to males and older patients, as they have a lower level of adherence.

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

СЕРТИФІКАТ УЧАСНИКА

Цим засвідчується, що

Abdallaoui Yassine
Scientific supervisor: Zhabotynska N.V.

брав(ла) участь у роботі
XXIX Міжнародної науково-практичної конференції молодих вчених та студентів
«АКТУАЛЬНІ ПИТАННЯ СТВОРЕННЯ НОВИХ ЛІКАРСЬКИХ ЗАСОБІВ»

В.о. ректора
Національного фармацевтичного
університету   Алла КОТВІЦЬКА

19-21 квітня 2023 р, м. Харків

National University of Pharmacy

Faculty for foreign citizens' education
Department of Pharmacology and Pharmacotherapy

Level of higher education master

Specialty 226 Pharmacy, industrial pharmacy
Educational program Pharmacy

> **APPROVED**
> **The Head of Department**
> **Pharmacology and**
> **Pharmacotherapy**
>
> _____
>
> **Sergei SHTRYGOL'**
> «21» September 2022

ASSIGNMENT
FOR QUALIFICATION WORK
OF AN APPLICANT FOR HIGHER EDUCATION

Yassine ALAOUI ABDALLAOUI

1. Topic of qualification work: «Study of factors influencing adherence of patients with type 2 diabetes», supervisor of qualification work: Nataliia ZHABOTYNSKA, PhD, assoc. prof.
approved by order of NUPh from "06" of February 2023 № 35
2. Deadline for submission of qualification work by the applicant for higher education: april 2023.
3. Outgoing data for qualification work: publications on the problems of patient's adherence with drug therapy in Ukraine and worldwide; scientific data on the study of adherence of patients with endocrine diseases.
4. Contents of the settlement and explanatory note (list of questions that need to be developed):
to develop a questionnaire to assess the adherence of patients with diabetes type 2; to study the adherence of patients with type 2 diabetes; based on the obtained results, propose possible ways to improve the adherence of patients with diabetes type 2.
5. List of graphic material (with exact indication of the required drawings):
- description of hypoglycemic drugs that patients received in the study (1 table);
- distribution of patients with diabetes type 2 by age (1 figure);
- description of the duration of the disease with diabetes type 2 (1 figure);
- description of the nature of comorbidity in patients with diabetes type 2 mellitus (1 table);
- assessment of well-being in patients with type 2 diabetes mellitus (1 figure);
- description of the frequency of blood glucose control in patients with diabetes type 2 (1 figure);

- description of the number of hospitalizations in the last 12 months (1 figure);
- analysis of groups of drugs for hypoglycemic therapy, which patients received in the study (1 figure);
- characteristics of combined hypoglycemic therapy (1 table);
- results of a survey of patients with diabetes type 2 on the HB-MAS scale (1 table);
- characteristics of the adherence of patients with diabetes type 2 (1 figure);
- description of the adherence of patients with diabetes type 2 depending on gender (1 figure);

6. Consultants of chapters of qualification work

Signature	Name, SURNAME, position of consultant	Signature, date	
		assignment was issued	assignment was received
1	Nataliia ZHABOTYNSKA, associate professor of higher education institution of Pharmacology and pharmacotherapy department	09.02.2023	09.02.2023
2	Nataliia ZHABOTYNSKA, associate professor of higher education institution of Pharmacology and pharmacotherapy department	06.03.2023	06.03.2023
3	Nataliia ZHABOTYNSKA, associate professor of higher education institution of Pharmacology and pharmacotherapy department	03.04.2023	03.04.2023

7. Date of issue of the assignment: "21" September 2022

CALENDAR PLAN

№	Name of stages of qualification work	Deadline for the stages of qualification work	Notes
1.	Writing Chapter 1 "Literature Review"	February 2023	**done**
2.	Development of a questionnaire for conducting a survey of patients	February 2023	**done**
3.	Conducting a patient survey, writing Chapter 2 "Research Methods"	March 2023	**done**
4.	Statistical processing of survey results	March 2023	**done**
5.	Writing Chapter 3 "Research Results"	March 2023	**done**
6.	Finalization of qualification work and preparation of documents	April 2023	**done**

An applicant of higher education _____ Yassine ALAOUI ABDALLAOUI

Supervisor of qualification work _____ Nataliia ZHABOTYNSKA

ВИТЯГ З НАКАЗУ № 35
По Національному фармацевтичному університету
від 06 лютого 2023 року

нижченаведеним студентам 5-го курсу 2022-2023 навчального року, навчання за освітнім ступенем «магістр», галузь знань 22 охорона здоров'я, спеціальності 226 – фармація, промислова фармація, освітня програма – фармація, денна форма здобуття освіти (термін навчання 4 роки 10 місяців та 3 роки 10 місяців), які навчаються за контрактом, затвердити теми кваліфікаційних робіт:

Прізвище студента	Тема кваліфікаційної роботи		Посада, прізвище та ініціали керівника	Рецензент кваліфікаційної роботи
• **по кафедрі фармакології та фармакотерапії**				
Алауі Абдаллауі Яссін	Вивчення факторів, які впливають на комплаєнс пацієнтів з цукровим діабетом II типу	Study of factors influencing adherence of patients with diabetes type II	Доц. Жаботинська Н.В.	Доц. Должикова О.В.

Підстава: подання декана, згода ректора

Ректор

Вірно. Секретар

ВИСНОВОК

Комісії з академічної доброчесності про проведену експертизу
щодо академічного плагіату у кваліфікаційній роботі
здобувача вищої освіти

№ 112702 від « 28 » квітня 2023 р.

Проаналізувавши випускну кваліфікаційну роботу за магістерським рівнем здобувача вищої освіти денної форми навчання Алауі Абдаллауі Яссін, 5 курсу, _____ групи, спеціальності 226 Фармація, промислова фармація, на тему: «Вивчення факторів, які впливають на комплаєнс пацієнтів з цукровим діабетом ІІ типу / Study of factors influencing adherence of patients with diabetes type II», Комісія з академічної доброчесності дійшла висновку, що робота, представлена до Екзаменаційної комісії для захисту, виконана самостійно і не містить елементів академічного плагіату (компіляції).

Голова комісії,
професор   **Інна ВЛАДИМИРОВА**

0%
20%

REVIEW

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

Yassine ALAOUI ABDALLAOUI

on the topic: «Study of factors influencing adherence of patients with type 2 diabetes»

Relevance of the topic. Diabetes is one of the most common diseases in the world. One reason for poor blood glucose control is poor patient's adherence. The study of the adherence of patients with diabetes type 2, the study of the factors that determine it, can serve as the basis for the development of methods for improving the adherence of patients to pharmacotherapy, which will lead to an improvement in the prognosis of diabetes, a decrease in the frequency of its complications.

Practical value of conclusions, recommendations, and their validity. The results of the qualification work made it possible to assess the adherence of patients with type 2 diabetes mellitus and the level of glycemic control, adherence with modern recommendations for the pharmacotherapy for diabetes type 2, identify factors affecting the level of patient's adherence, and suggest possible ways to improve it.

Assessment of work. The qualification work is a completed research, designed in accordance with all requirements. It is recommended to conduct an additional check of spelling errors and the correctness of the list of references.

General conclusion and recommendations on admission to defend. The work is performed in full, designed in accordance with the current requirements for the qualification works at the National University of Pharmacy, and can be recommended for submission to the SEC for further defense.

Scientific supervisor   _____   Nataliia ZHABOTYNSKA

«5» April 2023

REVIEW

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

Yassine ALAOUI ABDALLAOUI

on the topic: «Study of factors influencing adherence of patients with type 2 diabetes»

Relevance of the topic. Patient's adherence is the most important factor in the effective treatment of various diseases. The study of the compliance of patients with diabetes type 2, the identification of factors that affect its level and the development of recommendations for its increase can be a component of a comprehensive program to improve the effectiveness of blood glucose control in patients with diabetes type 2 and reduce the risk of cardiovascular complications leading to the death of these patients.

Theoretical level of work. The qualification work has a high theoretical level, based on domestic and international recommendations for the pharmacotherapy of diabetes type 2.

Author's suggestions on the research topic. The author created a questionnaire to assess the adherence of patients with diabetes type 2 and, based on the results obtained, described the factors influencing adherence and suggested methods for improving the adherence of such patients.

Practical value of conclusions, recommendations, and their validity. The results of the work and the conclusions drawn on their basis are of high practical importance for the implementation of methods to increase the effectiveness of the pharmacotherapy of diabetes type 2 with the participation of both doctors and pharmacists.

Disadvantages of work. There are grammatical and punctuation errors, unsuccessful stylistic turns in the work.

General conclusion and assessment of the work. The work meets the requirements for qualification work in National University of Pharmacy and can be recommended for defense.

Reviewer　　　　_____　　　Olena DOLZHYKOVA

«10» April 2023

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ
Витяг з протоколу № 14
від 11 квітня 2023 року
м. Харків
засідання кафедри фармакології та фармакотерапії

ПРИСУТНІ: зав. каф. проф. Штриголь С.Ю., проф. Кіреєв І.В., проф. Деримедвідь Л.В, проф. Бутко Я.О., проф. Щокіна К.Г., доц. Бєлік Г.В., доц. Рябова О.О., доц. Жаботинська Н.В., доц. Куценко Т.О., доц. Таран А.В., доц. Матвійчук А.В., доц. Савохіна М.В., доц. Степанова С.І., ас. Кононенко А.В., ас. Толмачова К.С., ас. Цеменко К.В., Адлер Б.А., Чубар`ян Ю.І., Барзак Д.Т., Краснораменська О.В., Шульга Ю.М., Рубан Я.В., Суровцева Д.О., Леонова Я.І., Заворотько Д.І., Вороніна А.О., Давидов Е.М., Шостенко К.В., Дібт Шараф Еддін, Жудат Ікрам, Алауі Абдаллауі Яссін, Буррус Ахлам, Ель Хамді Мохаммед, Меллоукі Хамза, Іфтахі Яссін, Карім Ашраф, Айнау Умайма, Елбадауі Хажар, Ель Хайель Хаджар, Толбі Ель Мехді, Беналлал Зінеб, Бенсаід Мохаммед, Ел-Жамаі Сальма, Ельбахаджі Раіхана, Бензід Ясіне, Кадді Каутар.

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

СЛУХАЛИ:
Здобувача вищої освіти Алауі Абдаллауі Яссіна зі звітом про проведену наукову діяльність за темою кваліфікаційної роботи: «Вивчення факторів, які впливають на комплаєнс пацієнтів з цукровим діабетом II типу».

УХВАЛИЛИ:
Кваліфікаційну роботу розглянуто. Здобувач вищої освіти Алауі Абдаллауі Яссін допускається до захисту даної кваліфікаційної роботи в Екзаменаційній комісії.

Завідувач кафедри фармакології
та фармакотерапії, проф.   _____   Штриголь С.Ю.
Секретар кафедри фармакології
та фармакотерапії, ас.   _____   Кононенко А.В.

НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

ПОДАННЯ
ГОЛОВІ ЕКЗАМЕНАЦІЙНОЇ КОМІСІЇ
ЩОДО ЗАХИСТУ КВАЛІФІКАЦІЙНОЇ РОБОТИ

Направляється здобувач вищої освіти Яссін АЛАУІ АБДАЛЛАУІ до захисту кваліфікаційної роботиза галуззю знань 22 Охорона здоров'я
спеціальністю 226 Фармація, промислова фармація
освітньою програмою Фармація
на тему: «Вивчення факторів, які впливають на комплаєнс пацієнтів з цукровим діабетом ІІ типу».

Кваліфікаційна робота і рецензія додаються.

Декан факультету _____ / Світлана КАЛАЙЧЕВА /

Висновок керівника кваліфікаційної роботи

Кваліфікаційна робота здобувача вищої освіти Яссіна АЛАУІ АБДАЛЛАУІ є самостійним оригінальним дослідженням, виконана на високому науковому рівні, відповідає всім вимогам, може бути представлена в Екзаменаційну комісію Національного фармацевтичного університету та рекомендована до захисту на здобуття освітньо-кваліфікаційного рівня магістра та заслуговує позитивної оцінки.

Керівник кваліфікаційної роботи

_____   Наталія ЖАБОТИНСЬКА

"5" квітня 2023 року

Висновок кафедри про кваліфікаційну роботу

Кваліфікаційну роботу розглянуто. Здобувач вищої освіти Яссін АЛАУІ АБДАЛЛАУІ допускається до захисту даної кваліфікаційної роботи в Екзаменаційній комісії.

Завідувач кафедри
фармакології та фармакотерапії

_____   Сергій ШТРИГОЛЬ

"11" квітня 2023 року

Qualification work was defended

of Examination commission on

« ___ » _____ 2023

with the grade _____

Head of the State Examination commission,

DPharmSc, Professor

_____ / Oleh SHPYCHAK /