MINISTRY OF HEALTH CARE OF UKRAINE
ODESA NATIONAL MEDICAL UNIVERSITY

Faculty of Medicine and Pharmacy

Department of Organization and Economics of Pharmacy
with Post-Diploma Specialization

KARKAR Ibtissam

OPTIMISATION OF MEDICINES PROVISION FOR WOMEN WITH OBESITY IN MENOPAUSE

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Scientific supervisor:
senior teacher Oksana STEPANOVA
Reviewer:
PHD, Associate professor
Serhei STRECHEN

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Head of the department

_____Oksana BIELIAIEVA

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_____Valeria LIASHENKO-SHCHERBAKOVA

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ABSTRACT.

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The research is devoted to the problem of obesity in postmenopausal women, the analysis of current treatment approaches, and the role of pharmaceutical care in optimizing therapy. Obesity is a chronic multifactorial disease characterized by excessive accumulation of adipose tissue and is associated with the development of metabolic syndrome, diabetes mellitus, cardiovascular diseases, and certain types of cancer. In postmenopausal women, the risk of obesity significantly increases due to hormonal changes leading to metabolic disturbances and weight gain.

The study analyzes current clinical guidelines for the treatment of obesity, including therapeutic and surgical approaches. The therapeutic approach involves lifestyle modification, diet therapy, increased physical activity, behavioral therapy, and pharmacotherapy, which is indicated for patients with a body mass index (BMI) $\geq$30 kg/m² or $\geq$27 kg/m² in the presence of obesity-related complications. Surgical treatment is applied in cases where conservative therapy is ineffective. It is emphasized that effective obesity management requires a comprehensive and interdisciplinary approach.

The results of the study demonstrate that current obesity management methods are often insufficient without an individualized approach and proper coordination among physicians, pharmacists, and other healthcare professionals. The importance of pharmaceutical care in improving treatment outcomes is substantiated, particularly through personalized selection of medications, treatment monitoring, and enhancement of patient adherence to therapy.

The obtained results have practical significance for optimizing pharmaceutical care for patients with obesity and can be used to improve interdisciplinary approaches to the management of this condition.

Keywords: obesity, postmenopausal period, pharmacotherapy, body mass index, pharmaceutical care, metabolic syndrome, interdisciplinary approach.**

CONTENT

LIST OF CONDITIONAL DESIGNATIONS

ATP-adenosine triphosphate

ATC-anatomical-therapeutic-chemical classification

BarX-bariatric surgery

DD-dietary supplement

BMI- body mass index

IR- insulin resistance

Drug - medicinal product

LRS - medicinal plant raw materials

MS- metabolic syndrome

MT-body mass

NBM- overweight

CVD - cardiovascular diseases

TG- triglycerides

FMT - fecal microbiota transplantation

cAMP - cyclic adenosine monophosphate

AgRP Agouti-related protein

EASO- European Association for the Study of Obesity

EOSS-Edmond Obesity Scoring System

MC4R melanocortin-4 receptor

PYY peptide tyrosine-tyrosine)

SCFA- short-chain fatty acids

WHO- World Health Organization

WHR- waist to hip ratio

INTRODUCTION

Relevance of the topic. The prevalence of overweight and obesity is one of the most widespread health problems in the world. The WHO report on obesity in the European Region in 2022 determined that obesity in the Region has reached epidemic proportions and continues to grow. According to WHO, more than 2 billion adults and children in the world are overweight, and of these, more than 680 million people suffer from obesity. The projected economic impact of the increase in population with overweight and obesity from 2020 to 2035 indicates that this impact amounted to US$1.96 trillion in 2020, and will grow to US$4 trillion in 2035. [1].

According to the latest STEPS study conducted in 2019 on the health status of the population in Ukraine, the average body mass index (BMI) of an adult was 26.8 kg/m2, and increased with age. Only two-fifths (39.6%) of the population in Ukraine had a normal weight (BMI 1.5-24.9 kg/m2). Almost three-fifths (59.1%) were overweight (BMI ≥ 25 kg/m2), including a quarter of the population (24.8%) who were obese (BMI ≥ 30 kg/m2). Both overweight and obesity rates increased sharply with age. Obesity was more common among women (men – 20.1%; women – 29.8%) [2].

The increasing prevalence of obesity is a global public health concern, as excess weight increases the risk of several diseases, including cardiovascular disease, diabetes, cancer, and others [3]. In addition, obesity can impair a person's quality of life, lead to social isolation, and lead to psychological problems [4].

One of the reasons for the increase in the number of people with obesity is a change in lifestyle, a decrease in physical activity and an increase in the consumption of unhealthy foods. Therefore, the problem of obesity requires attention and consideration within the framework of global health and development programs, as well as an individual approach to the prevention and treatment of obesity in each individual person [5].

Many women subjectively notice changes in their weight or body shape during the menopausal transition. Fear of weight gain is in fact one of the most commonly reported concerns about menopaus [6]. This concern is not unfounded: numerous studies document that the majority of women do gain weight as they go through menopause [7,8]. Approximately 60–70% of women in midlife report experiencing noticeable weight gain during the menopausal transition [9]

The European Association for the Study of Obesity (EASO) considers obesity a priority for health, research and society. It contributes to the study of obesity and overweight (OBE). In addition, EASO promotes and participates in scientific and educational activities that reduce the burden of unhealthy overweight in Europe through education, prevention and treatment of the obesity epidemic and its control [10].

Pharmacological treatment should be considered a large and significant part of a comprehensive disease management strategy. Pharmacotherapy can help patients reduce the health risks associated with obesity, improve their quality of life, and raise public awareness of the pharmaceutical supply of drugs that affect the problem of obesity [11].

Purpose and objectives of the work. The aim of the study is to determine the specifics of pharmaceutical care for postmenopausal women with obesity and to substantiate the need for, and ways to optimise, this care through effective interdisciplinary collaboration. To achieve this goal, the following tasks were set:

- summarize the main concepts, terms and subject of research on obesity incidence, trends in the dynamics of the incidence in the world and in Ukraine;
- to conduct an analysis of medicines used to treat obesity in Ukraine and other countries;
- to systematize and analyze the modern market of dietary supplements in Ukraine
- Analyze the current state of pharmaceutical care provided to postmenopausal women with obesity, identifying existing gaps and challenges.

- Investigate the specific pharmaceutical needs of this patient group, considering the physiological changes associated with menopause and the complexities of obesity management.
- Evaluate the role of interdisciplinary collaboration (e.g., between pharmacists, physicians, dietitians, and other healthcare professionals) in optimizing pharmaceutical care for these patients.
- Develop recommendations and strategies for enhancing pharmaceutical care, promoting adherence to treatment, and improving health outcomes in postmenopausal women with obesity through collaborative practices.To develop practical recommendations for pharmacists to improve pharmaceutical care of postmenopausal women with obesity based on the principles of interdisciplinarity.
- To identify possible mechanisms for establishing and improving interaction between pharmacists and other healthcare professionals.

Research objects.There were data from scientific sources on obesity and overweight, statistical and questionnaire information on the use and availability of pharmaceuticals for the prevention and treatment of the problem under study.

Subject of study— prevalence and incidence of obesity and overweight, nature of eating behavior and level of physical activity, pharmaceutical provision of drugs that affect the problem of obesity and overweight in modern conditions of the pharmaceutical market.

Research methods. To achieve the goal and objectives set in the research process, the following methods were used: systemic, statistical, questionnaire-survey methods, generalized and theoretical analysis of scientific and methodological literature.

Theoretical significance of the study. This study develops novel guidelines to optimize cooperation between doctors, pharmacists, and patients, especially crucial for postmenopausal women with obesity.The key novelty lies in the active involvement of pharmacists in obesity prevention and treatment. This approach will

enhance the effectiveness of interventions, considering the unique needs of this patient group, and provide more holistic and personalized care.

Practical significance of the results obtained To improve the prevention and treatment of overweight and obesity, guidelines have been developed to optimise collaboration between doctors, pharmacists and patients.

Approval of the research results. Based on the research findings, a thesis of the report on the topic «The pharmacist's role in optimizing obesity management in menopausal women» at the 1st International Scientific and Practical Conference "Modern Scientific Research: Theoretical and Practical Aspects" April 14-16, 2025 Riga, Latvia

Structure and scope of the study. The qualification work is presented on 72 pages and consists of an abstract, table of contents, list of abbreviations, introduction, literature review, analysis of research results, conclusions, and a list of references. The work contains 3 figures and 4 tables.

CHAPTER 1. THE PROBLEM OF OBESITY DEVELOPMENT LITERATURE REVIEW

1.1. Etiology and pathogenesis of obesity

Obesity and overweight may seem similar, but they actually have some differences.Obesity is a complex chronic polyetiological disease, the main characteristic of which is an excessive amount of adipose tissue, which can lead to the development of various diseases, including metabolic syndrome [6].

A key role in the pathogenesis of obesity during menopause is attributed to estrogen deficiency. It has been proven that the deficiency estrogen deficiency has been shown to reduce the intensity of lipolysis, which leads to the accumulation of adipose tissue, mainly in the area of the anterior abdominal wall. It was found that the degree of decrease of the resting metabolic rate after menopause corresponds to an energy accumulation of 60,000-80,000 per year, equivalent to an increase in body weight of 3-4 kg.

According to research, adipose tissue is not only the largest source of energy in the body, but also an endocrine organ (white adipose tissue). Adipose tissue cells (adipocytes) produce peptide substances - adipocytokines or adipokines, which are involved in the regulation of energy homeostasis, insulin action and lipid metabolism. One of the most important adipokines is leptin, a key regulator of energy balance in the body. The leptin content in the blood increases with increasing adipose tissue mass. The level of leptin reflects not only the amount of stored fat, but also the violation of energy metabolism. Estrogens have been found to potentiate the effect of leptin. Body mass index (BMI) is a way of measuring whether a person's body weight is above normal for their height. It is measured by taking the person's weight in kilograms and dividing this number by the square of the person's height in meters (kg/m2). A high result may indicate a high body fat percentage [7] (See Fig. 1.1)

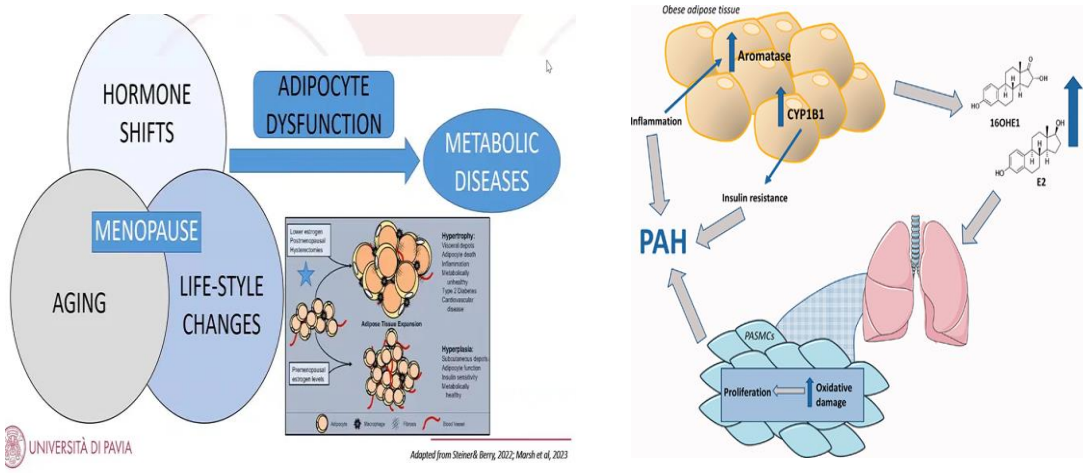


Fig. 1.1 Pathogenetic mechanisms of obesity in menopause

Overweight is a body weight classification determined by BMI. Overweight people weigh more than people who fall into the "healthy weight" and "underweight" ranges by BMI, but less than people who fall into the obese category by BMI.

The main differences between obesity and overweight are that overweight is simply a body weight above normal, while obesity indicates the presence of excess adipose tissue, which can cause various diseases. At the same time, both of these conditions can be risk factors for the development of metabolic syndrome and other diseases.

1.2. Classification and methods of diagnosing obesity

Depending on the causes of obesity and its characteristics, different classifications of obesity are distinguished. Currently, the World Health Organization (WHO) provides a classification based on BMI, which is the most common. BMI is calculated as a person's body weight in kilograms divided by their height in meters squared (kg/m²). In adults, a BMI of 25 or more indicates overweight, and a BMI of 30 or more indicates obesity [8].

The following categories are distinguished by BMI:

- Underweight: BMI under 18.5 kg/m²
- Normal weight: BMI from 18.5 to 25 kg/m²
- Overweight: BMI from 25 to 30 kg/m²
- Obesity of 1 degree: BMI from 30 to 35 kg/m²
- Obesity stage 2: BMI from 35 to 40 kg/m²

- Grade 3 obesity (morbid): BMI more than 40 kg/m²

BMI is a measure of size, not health, and therefore has some limitations as a diagnostic tool. For example, athletes are commonly misclassified because of their large muscle mass. Thus, BMI is most useful at the population level and for risk assessment, rather than diagnosis, at the individual level.

Other methods of classifying obesity include measuring waist-to-hip ratio and the Edmonton Obesity Scoring System (EOSS).

Waist circumference is a fairly simple and convenient measure, and it is considered a qualitative indicator of intra-abdominal or visceral fat. Men with a waist circumference of more than 112 cm and women with a waist circumference of more than 93 cm are at high risk of developing cardiovascular disease and other chronic diseases [10].

Depending on the ratio of waist to hip circumference (WHR), they are classified as:

- 1st degree: WHR less than 0.95 in men and less than 0.80 in women;
- 2nd degree: WHR between 0.96-1.0 in men and between 0.81-0.85 in women;
- Grade 3: WHR between 1.0-1.05 in men and between 0.85-0.90 in women;
- Stage 4: WHR greater than 1.05 in men and greater than 0.90 in women

This obesity assessment system is simple and accessible for use in clinical practice. However, it has certain disadvantages, such as insufficient accuracy for certain population groups, such as the elderly, pregnant women, and athletes. Therefore, its use should be accompanied by other methods of obesity assessment, such as body mass index.

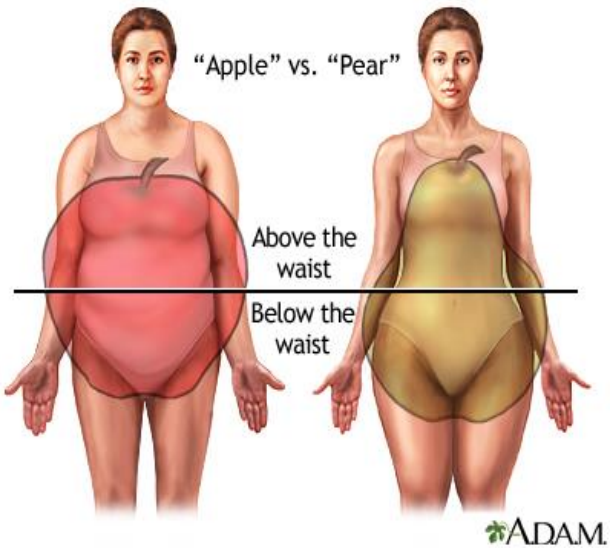
According to the Edmond Obesity Scoring System, obesity is classified into five stages that take into account metabolic, physical, and psychological parameters to determine the optimal method of obesity treatment [11].

1.3. Effect of menopause on the development of obesity

Menopause significantly influences the development of obesity in women through a complex interplay of hormonal, metabolic, and lifestyle factors. While aging itself contributes to weight gain, the menopausal transition introduces specific physiological changes that make weight management more challenging. Here's a breakdown of the key effects:

Hormonal Changes, Primarily Estrogen Decline:

Fat Redistribution: The most notable effect of declining estrogen levels is a shift in fat distribution. Before menopause, women typically accumulate fat in a "gynoid" pattern (hips and thighs, often described as "pear-shaped"). After menopause, as estrogen levels drop, fat tends to redistribute to the abdominal area, leading to an "android" or "apple-shaped" body type. (See Fig. 1.2)



F*ig. 1.2 "android" or "apple-shaped" body type.*

This visceral (abdominal) fat is metabolically more active and carries a higher risk for cardiovascular disease, insulin resistance, and type 2 diabetes [12]

Metabolic Rate Slowdown: Estrogen plays a role in regulating metabolism. Its decline can lead to a slight decrease in resting metabolic rate (the number of calories burned at rest). While not a massive drop, this reduction over time can contribute to gradual weight gain if calorie intake remains the same.

Insulin Sensitivity: Lower estrogen levels can also affect insulin sensitivity, making it harder for the body's cells to absorb glucose efficiently. This can lead to higher blood sugar levels and increased fat storage, particularly in the abdominal region.

Appetite Regulation: Some research suggests that estrogen may influence appetite-regulating hormones (like leptin and ghrelin), potentially leading to increased appetite and reduced feelings of fullness [13]

Loss of Muscle Mass (Sarcopenia): As women age, there's a natural decline in lean muscle mass, a process called sarcopenia. Muscle tissue is more metabolically active than fat tissue, meaning it burns more calories at rest. The loss of muscle mass, irrespective of hormonal changes, contributes to a lower basal metabolic rate, making it easier to gain weight. Menopause may accelerate this muscle loss.

Lifestyle and Behavioral Factors:

Reduced Physical Activity: Many individuals, regardless of gender, tend to become less physically active as they age due to various reasons, including joint pain, fatigue, or changes in daily routines. This decrease in energy expenditure directly contributes to weight gain [14]

Dietary Habits: While not directly caused by menopause, aging can lead to changes in dietary habits. If caloric intake isn't adjusted to account for a slower metabolism and reduced activity, weight gain will occur.

Sleep Disturbances: Menopausal symptoms like hot flashes and night sweats often disrupt sleep. Poor sleep is linked to hormonal imbalances that can increase appetite and cravings for unhealthy foods, further contributing to weight gain.

Stress: The emotional and physical stress associated with menopausal symptoms and life changes can also influence eating habits and weight [15].

In summary, while weight gain is a common occurrence with aging, menopause acts as a significant amplifier, primarily by altering fat distribution due to estrogen decline, contributing to a slower metabolism through muscle loss, and often exacerbating lifestyle factors that promote weight gain. This makes effective weight management during and after menopause a complex challenge requiring a comprehensive approach.

1.4. Factors that contribute to obesity during menopause

Obesity is the result of genetic, behavioral, environmental, physiological, social and cultural factors that lead to energy imbalances and promote excessive fat storage. Menopausal women are a special category of high-risk individuals for obesity. Menopause is an important physiological stage in a woman's entire body that marks the end of her reproductive activity [16]. The relative contribution of each of these factors has been widely studied, and although genes play an important role in body weight regulation, the WHO concluded that this pathological condition most often results from the consumption of high-calorie foods that are high in fat, sugar, and salt, but low in vitamins, minerals, and trace elements, fiber, which are essential for normal body function [17].

In a 3-year follow-up of 3000 young adults, those who consumed significantly more fast food weighed an average of ~6 kg more and had larger waist circumferences than those who consumed the least fast food. They were also found to have more negative weight-related health problems, such as elevated triglyceride levels and twice the risk of developing cardiovascular disease (CVD). These problems are compounded in individuals who have a genetic predisposition to fat accumulation, which may be due to significant interactions between homeostatic circuits and the brain’s reward circuitry [18].

An important factor is also the decrease in daily physical activity, which is associated with an increase in sedentary activities, especially due to restrictions on access to public places and the transfer of many activities to home due to the COVID-19 pandemic.

Among other factors, Factors that play a role in the formation of obesity include:

1. Age and gender. As we age, our body's ability to digest food slows down, but we still eat the same amount of food and do the same activities as when we were younger, and so we gain weight. In general, women are more likely to be overweight than men. This is because women have a lower metabolic rate. Also, during menopause, women's production of the female sex hormone estrogen decreases, which is why many women gain weight after menopause and become obese.

2. Psychological factors. Many people turn to food as a way to cope with stress, anxiety, or other emotional problems, which can lead to overeating and weight gain. Low self-esteem, body dissatisfaction, and a lack of social support can also lead to feelings of isolation and loneliness, which can contribute to emotional overeating.

3. Genetic factors. Obesity (as well as thinness) can be hereditary. Many people have a genetic predisposition to obesity, but do not gain weight if they lead a healthy lifestyle. Theyplay a significant role in the development of obesity. According to scientific sources, genetic causes of obesity can be broadly classified as:

1) monogenic causes, which are the result of a single gene mutation, mainly localized in the leptin-melanocortin pathway. Many genes, such as AgRP (Agouti-related protein), PYY (peptide tyrosine-tyrosine) or MC4R (melanocortin-4 receptor), have been identified for monogenic obesity, which disrupts the appetite and weight regulatory system, hormonal signals (ghrelin, leptin, insulin) are perceived by receptors located in the arcuate nucleus of the hypothalamus [19].

2) Syndromic obesity is severe obesity that results from abnormalities in the development of the nervous system and other organ/system malformations. It can be caused by changes in a single gene or a larger chromosomal region encompassing several genes [20].

3) Polygenic obesity is caused by the cumulative contribution of many genes. In addition, some obese people gain weight because they have many genes [21], and these genes cause them to prefer food and therefore consume more calories.

The presence of these types of genes may cause increased calorie intake, increased hunger levels, decreased control over overeating, decreased satiety, increased tendency to accumulate body fat, and increased tendency to lead a sedentary lifestyle [22].

4. The role of the gastrointestinal (GI) microbiome plays an important role in the development of obesity. This means that the composition of the microbiome in the gastrointestinal tract can influence the development of obesity.

In recent years, our knowledge of the gut microbiome has grown significantly, as has our understanding of its complex relationship with various diseases. For example, obesity is sometimes associated with an altered gut microenvironment [23]. Such an environment is more susceptible to the development and proliferation of pathogenic microorganisms that can cause serious diseases, including obesity [24].

The human body contains approximately 3.8×1013 microorganisms, most of which are located in the gastrointestinal tract. More than half of the microbial population is composed of bacteria, followed by archaea and eukarya [25]. Normally, the gut microbiome plays important beneficial roles in the body, including participation in carbohydrate and lipid metabolism, vitamin and amino acid synthesis, epithelial cell proliferation, protection against pathogens, and hormonal modulation. Gut bacteria can also break down indigestible molecules such as human milk oligosaccharides and plant polysaccharides .Recent studies suggest that calorie restriction can positively affect the gut microbiome, and antibiotic use can negatively affect the gut microbiota, which may lead to the development of diabetes and obesity. Clinical studies support the findings that microbiome changes are associated with obesity, however, the exact mechanisms (i.e., the ratio and amount of microflora diversity) are still unknown [26].

The gut microbiome is a central element of the body's immune system. Disruption of the gut microbiota can lead to inflammation of the intestinal mucosa Fermentation of dietary fiber and starch in the lower gastrointestinal tract induced by the microbiome can also produce SCFA (short-chain fatty acids), which can regulate the production of gut hormones such as peptide YY (PYY) in the intestinal epithelium and GLP-1, GLP-2 (glucagon-like peptides), as well as the secretion of gastric inhibitory peptides by K cells [27].

In obese patients, enzymes involved in glucose signaling pathways are suppressed, so changes in individual microbial populations are more important than overall phylogenetic relationships, leading to changes in enzyme and SCFA production, which further affect insulin and glucose regulation, ultimately leading to the development of obesity [28].

1.5. Metabolic syndrome in obesity

Metabolic syndrome (MS) is a cluster of cardiometabolic risk factors in an individual, including hypertension, abdominal and central obesity, dyslipidemia, and insulin resistance. There are several different definitions of MS, but all include insulin resistance or glucose intolerance, hypertension, dyslipidemia, and central obesity [29].

Obesity-related MS is a condition in which an obese person is at high risk of developing cardiovascular disease and diabetes. The main cause of obesity-related MS is insulin resistance (IR), a condition in which the body’s cells do not respond to insulin, a hormone that regulates blood sugar levels. If insulin resistance persists, elevated blood sugar levels can lead to diabetes, and high insulin levels can lead to weight gain, which exacerbates obesity. In addition to insulin resistance, obesity related MS may include factors such as hypertension, dyslipidemia, inflammation, and increased abdominal fat [30] (See Fig.1.3)

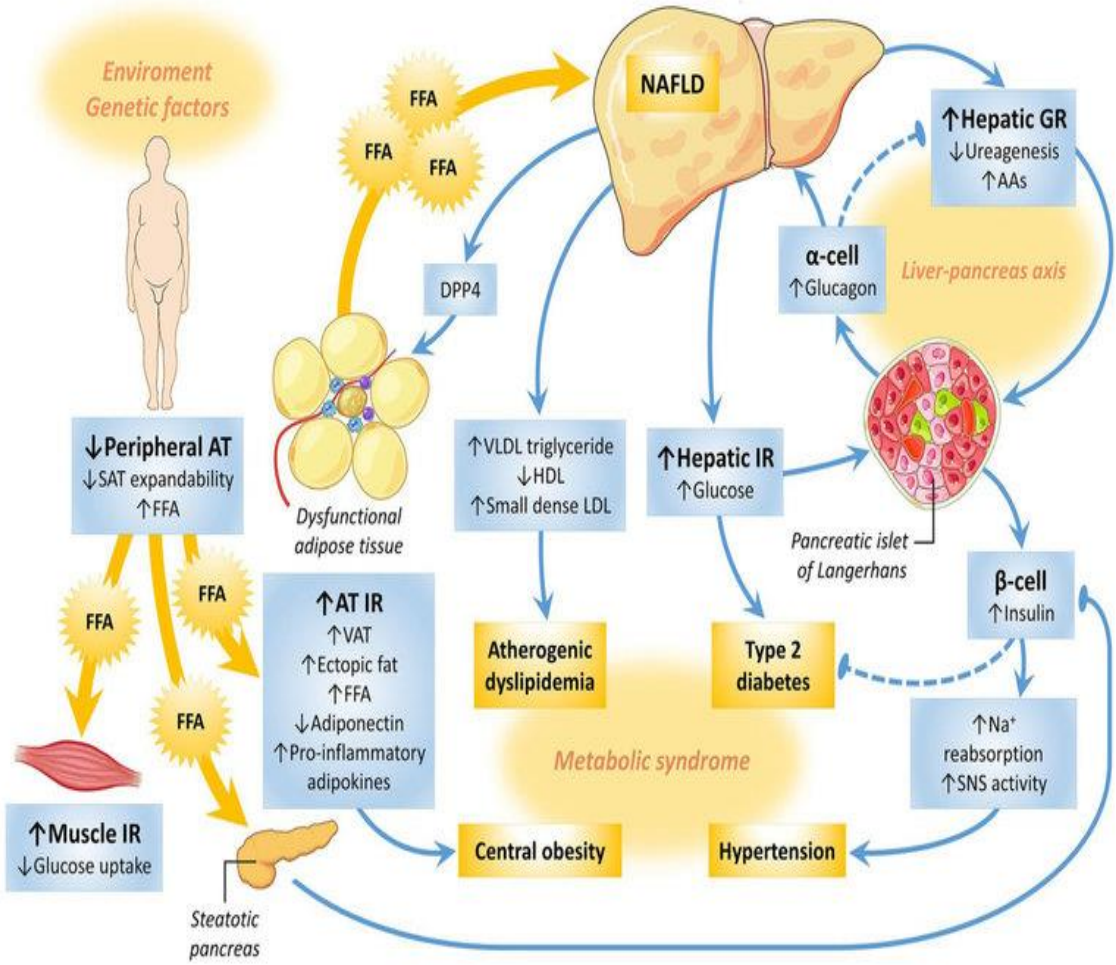


Fig.1.3 Abdominal obesity@ metabolic syndrome

Treatment of MS in obesity aims to reduce the risk of cardiovascular disease and diabetes, including dietary changes, increased physical activity, weight loss, and pharmacotherapy [31].

One of the key aspects of treating MS in obesity is weight loss. This can be achieved through dietary changes, increased physical activity, and pharmacotherapy to help control blood sugar and lipid levels. Medications to lower blood pressure and cholesterol levels may be prescribed to reduce the risk of cardiovascular complications such as myocardial infarction and stroke [32].

Although not all overweight or obese individuals have metabolic abnormalities, most are insulin resistant. “Metabolically benign” obesity in humans

is not associated with IR and atherosclerosis. IR, however, significantly increases the risk of developing type 2 diabetes. Abdominal obesity and IR are likely to play a central role in the development of MS. In the presence of IR, the mobilization of non-esterified free fatty acids from stored adipose tissue triglycerides is accelerated. As a result, the production of glucose, triglycerides, and very low-density lipoproteins is increased [33].

Despite the continuous increase in the incidence of obesity and the parallel increase in the prevalence of MS, ideal diagnostic criteria for MS have not yet been defined. Homeostasis model assessment (HOMA)-IR scores are higher in patients with MS than in those without MS The relationship between the severity of dysglycemia and long-term mortality is also associated with a higher prevalence of MS [34].

There is a discrepancy between the different criteria in the field of diagnosing MS. In a study evaluating the prevalence of MS in patients with carotid artery disease, anthropometric parameters, blood pressure, plasma glucose, and lipoproteins were measured in 644 patients. The aim was to investigate the correspondence of the diagnosis of MS according to the NHLBI/AHA and IDF criteria in these patients and to compare the frequency of cardiovascular risk factors in patients diagnosed according to these two criteria. The results showed that the prevalence of MS in patients with carotid artery disease was high regardless of the diagnostic criteria used, suggesting that different definitions of MS may identify the same individuals or serve as surrogate risk factors [35].

There are currently several different definitions of MS, leading to confusion and lack of understanding as to whether they identify the same group of individuals or merely represent risk factors. It is therefore important that diagnosis, prevention and treatment of MS be directed at the identified risk factors rather than the diagnosis of MS itself.

1.6. Conclusions to chapter № 1

1. Having reviewed the scientific literature on the topic, we can conclude that obesity and NMT are a serious health problem for people around the world.

2. Obesity is a complex chronic disease characterized by excessive adipose tissue and can be the cause of the development of various diseases, in particular metabolic syndrome. Metabolic syndrome combines a cluster of metabolic disorders, including insulin resistance (IR), abdominal obesity, dyslipidemia, hypertension, and glucose intolerance.

3. The development of obesity and metabolic syndrome is the result of genetic, behavioral, environmental, physiological, social, and cultural factors that contribute to energy imbalance and excessive fat deposition. An important cause of obesity is the consumption of high-calorie foods that are high in fat, sugar, and salt, but low in essential nutrients such as vitamins, minerals, trace elements, and fiber.

4. Prevention and treatment of obesity and metabolic syndrome should be aimed at reducing energy imbalance, promoting healthy eating, physical activity, changing unhealthy habits, and improving the environment.

5. A multifaceted approach to the management of obesity and metabolic syndrome includes an interdisciplinary approach, collaboration between different branches of medicine and patient involvement in the treatment process, and therefore it is important to conduct further research to better understand the causes, mechanisms and effective strategies for managing obesity and metabolic syndrome, which will reduce the negative impact of these conditions on population health.

CHAPTER 2. MANAGEMENT OF OBESITY IN MENOPAUSE

2.1 Clinical guidelines from international organizations on the treatment of obesity

Modern medicine offers two approaches to the treatment of obesity: therapeutic and surgical. The therapeutic approach includes diet, physical activity, lifestyle changes, and pharmacotherapy. The surgical approach to the treatment of obesity is used only in cases where the patient cannot lose weight with other treatment methods. Surgical treatment of obesity includes various types of operations, such as gastroscopy, gastric bypass, vertical gastroplasty, and others [36].

According to the standards of medical care for obese patients developed in Ukraine, the following methods of prevention and treatment of overweight and obesity are proposed: behavioral therapy, increased physical activity, dietary changes, pharmacotherapy, and surgical treatment [37].

Obese people are encouraged to lose at least 10% of their body weight through a combination of diet, physical activity, and behavioral therapy [46]. Significant short-term weight loss can be achieved through the selection of appropriate portion-controlled diets [38]. Long-term weight control can be achieved through high levels of physical activity and ongoing contact between the patient and the physician. In many cases, lifestyle modification leads to significant weight loss, which leads to a significant reduction in CVD risk [39].

The goal of behavioral therapy is to help patients identify and change their eating habits and physical activity levels. There are currently three main principles. The first principle is to set a goal, and the goal should be easy to achieve. For example, take a 20-minute walk 3 times a week, limit the consumption of certain foods or dishes to 2 times a week, or reduce the number of self-critical responses. The second principle is aimed at helping patients set realistic goals and make a reasonable plan to achieve them. Patients are encouraged to determine their own success strategy and develop a plan to achieve it.The third principle is that

behavioral therapy promotes gradual, small changes rather than rapid, major changes, as drastic, one-off behavioral changes are usually short-lived [40].

When developing strategies to combat obesity, it is important to consider the level of physical activity and the person's capacity for physical activity. It is recommended to reduce the time spent in inactivity, such as watching television, using the computer, or playing video games. The best types of physical activity are those that can be easily incorporated into daily life, such as brisk walking, gardening, or cycling. Guided exercise programs or other types of activity, such as swimming, walking (with a certain number of steps per day), or using the stairs more often, may also be useful [41].

Because food choices are largely influenced by the environment, it is important that governments improve policies and strengthen the environment to reduce the availability of unhealthy foods and make healthy foods more accessible. Policy decisions should aim to encourage the development of foods with lower sugar, fat and salt content, and to reduce the availability of foods that contribute to obesity, particularly for children [42].

These measures aim to create a healthy environment that promotes healthy eating and an active lifestyle. Ensuring the availability of healthy foods and encouraging behavioral changes can be important factors in reducing obesity and improving the overall health of the population.

It is also important to pay attention to aspects such as taxation of sugary drinks and the use of social marketing.

It is important that policymakers and marketers are aware of how food advertising can influence people's health and behavior. They should help create and promote products that promote healthy weight and weight loss. Nutritionists, physicians, and pharmacists also have an important role to play in educating people to evaluate food advertising and understand ways to lose weight [43].

Tackling the obesity crisis requires effective interventions that change people's behavior. These can include measures that motivate change (e.g.,

highlighting health benefits, educational projects on proper nutrition, encouraging healthy lifestyles), as well as measures that reduce the causes of obesity (e.g., policy changes, regulations, legislation).

Implementing these interventions could have a significant impact on reducing the obesity crisis and contributing to improving overall population health. It is important to maintain collaboration across multiple sectors, including policy, health, education, and business, to achieve success in the fight against obesity [44].

Pharmacotherapy of obesity is recommended for people with a BMI ≥30 (or a BMI ≥27 with comorbidities) who are unable to lose weight using lifestyle modification alone [45].

Bariatric surgery (BS) (surgical intervention) is most often prescribed for individuals with a BMI > 40 or a BMI > 35 with comorbidities who cannot lose weight with lifestyle modification or pharmacotherapy [46]. Contraindications include: pregnancy and lactation, the presence of cancer, tuberculosis, renal or hepatic insufficiency, and type 1 diabetes.

This method of treating obesity involves changing the volume of the stomach or the length of the esophagus through surgical intervention. The procedure is performed in a hospital after a preliminary history taking and necessary tests. The advantages of this method are a quick and noticeable effect, as well as a short recovery period and the start of metabolism. However, there are also certain disadvantages, such as the need to perform the procedure under general anesthesia and the presence of contraindications. In addition, after the operation, it is necessary to take vitamin and mineral complexes throughout life.

The main methods of surgical intervention are intragastric balloons, gastric banding, longitudinal or sleeve resection, and gastric bypass [47].

In the case of balloons, a special silicone balloon filled with a solution is inserted into the stomach. This helps the patient feel full sooner and leads to weight loss. However, this method is not recommended for longer than 6 months, as the body gets used to the balloon and the effect decreases.

Gastric banding involves placing a cuff on the upper part of the stomach, which reduces its volume and limits the amount of food eaten.

Longitudinal resection is an operation that involves removing the distended part of the stomach. This method is simple, effective, and not very traumatic, as it does not disrupt the anatomy of the gastrointestinal tract.

Gastroscopy involves changing the anatomy of the gastrointestinal tract. There are several types of gastroscopy, which may involve removing part of the intestine or connecting the stomach to the small intestine with a single anastomosis.

BarX is an effective treatment for obesity that not only helps patients lose weight but also affects various biological mechanisms in the body. Studies show that BarX reduces inflammation associated with obesity and affects biomarkers and the gut microbiota [48].

For example, gastric bypass, as one of the methods of BarX, contributes to an increase in the total microbial count in the gut of patients after surgery. Additional analysis showed that gastric bypass affects the expression of white adipose tissue genes, the regulation of genes that play an important role in the signaling pathway of transforming growth factor-β, as well as metabolic pathways and inflammatory responses.

The decrease in serum leptin levels, which is associated with a decrease in BMI, is usually a consequence of BarH. Women who had higher preoperative baseline leptin levels had an easier time maintaining weight after surgery, whereas women with lower preoperative baseline levels had an easier time gaining weight. There is a correlation between baseline leptin levels and changes in body weight, BMI, and total weight loss, although the degree of success of surgery cannot be predicted by the patient's serum leptin level [49].

Recently, researchers have been investigating the potential efficacy of fecal microbiota transplantation (FMT) as a novel treatment for obesity. This approach involves transferring the microbiota of healthy individuals to obese patients.

There is promising evidence that TFM may help with weight loss and maintenance. Researchers are conducting human studies to investigate this method in more detail. For example, scientists found that in obese adult men with diabetes, transplantation of taxa (isolated microorganisms) from lean donors improved microbial diversity and insulin sensitivity.

These results indicate the potential for the use of FMT in the treatment of obesity. Further studies are ongoing to understand the mechanisms of action and establish effective protocols for fecal microbiota transplantation [50].

2.2 Providing the pharmaceutical market of Ukraine with medicines for the prevention and treatment of obesity

The problem of obesity has serious consequences for the economy, as it causes reduced productivity and social problems. Highly developed countries make great efforts to promote a healthy lifestyle, since the costs of treating diseases and complications associated with obesity account for 2 to 8% of the annual health budget.

In Ukraine, in 2022, the clinical guideline and Standards of Medical Care “Obesity in Children” were approved. (Order of the Ministry of Health of Ukraine dated September 24, 2022 No. 1732 “On Approval of the Standards of Medical Care “Obesity in Children”). By order of the Ministry of Health of Ukraine dated March 3, 2023 No. 427, the clinical guideline and "Standards of medical care for obesity in adults" were approved [38].

This document is the result of long-term collective work of the Department of Family Medicine and Outpatient Therapy of the Odessa National Medical University under the leadership of Professor Valentyna Velychko with the participation of prominent scientists and doctors of our country.

The presented clinical guideline is a version of the CMAJ Canada clinical guideline Obesity in adults: a clinical practice guideline [51], adapted for the Ukrainian healthcare system.

This guideline reviews the basic principles of medical care, pharmacotherapy, and methods of prevention and measures to reduce the harm of obesity.

Also, one of the main tools is the regulation of the food market, in particular, the establishment of standards for the quality and safety of food products. For example, in 2020, a ban was introduced on the production, import and sale of food products with trans fats containing more than 2 g per 100 g [52].

The clinical guideline states the following basic principles of pharmacotherapy:

1. Counsel all obese patients (BMI ≥ 30 kg/m2) about diet, lifestyle, and weight loss goals.

2. Pharmacological therapy may be offered to those who have failed to achieve weight loss goals through dietary changes, exercise, and behavioral approaches alone.

3. The decision to start pharmacotherapy can only be made after discussing with the patient the advantages and disadvantages, the mechanism of action of the drug, side effects, and possible impact on the person's motivation.

4. Pharmacological therapy can be used not only to reduce body weight, but also to maintain lost weight.

5. If there is any doubt about the adequacy of dietary intake of certain micronutrients, especially among the elderly and other at-risk groups, consideration should be given to supplementing with vitamins and minerals that may be necessary for growth and development in young people or to maintain health in older people who may be malnourished. Among the many micronutrients, vitamin D is one of the most important, and recent studies have shown that vitamin D deficiency may contribute to weight gain [53].

6. It is important to monitor the effect of treatment and support it with lifestyle advice and adherence during regular follow-up examinations.

7. In people who have not achieved their weight loss goals, it is advisable to consider discontinuing pharmacotherapy.

8. In people with type 2 diabetes, weight loss may occur slowly, so less stringent targets and treatment adjustments may be required for such patients.

According to the standard, pharmacotherapy for weight loss is prescribed to people with a BMI ≥30 kg/m2 or a BMI ≥27 kg/m2 with complications associated with excess body fat. The use of drugs should be combined with diet therapy, physical activity, and psychological methods.Among the drugs, the guideline [54] recommends prescribing liraglutide 3.0 mg, a combination of naltrexone/bupropion, and orlistat.

Pharmacotherapy can be used both to maintain the achieved weight loss achieved through a healthy lifestyle and to prevent further weight gain. Medications such as liraglutide 3.0 mg or orlistat can help with this.

For patients with type 2 diabetes and overweight (BMI ≥27 kg/m2), pharmacotherapy is recommended in conjunction with a healthy lifestyle to reduce weight and improve glycemic control. Approved drugs include liraglutide 3.0 mg, naltrexone/bupropion combination, and orlistat.

It is worth noting that the drug of choice for the treatment of type 2 diabetes may be metformin. Metformin hydrochloride is a drug that helps lower blood sugar levels in people with type 2 diabetes. It does not stimulate insulin secretion and does not cause hypoglycemia. Metformin acts by three mechanisms: it reduces glucose production in the liver, improves insulin sensitivity in muscles, and reduces glucose absorption in the intestines.

Metformin also has a positive effect on lipid metabolism and helps to reduce the level of total cholesterol, low-density lipoproteins and triglycerides in the blood. In addition, it has been observed that when taking metformin, the body weight of patients decreases or remains stable. There are a number of studies related to the effect of metformin on weight loss [55,56]. It should be noted that despite the apparent multifacetedness and extensiveness of research, many properties and mechanisms of metformin are still insufficiently studied, so it should be noted that

it is currently inappropriate to prescribe metformin for the treatment of obesity in patients who do not have a diagnosis of type 2 diabetes.

It is recommended to use pharmacotherapy in combination with a healthy lifestyle for individuals with prediabetes and overweight (BMI ≥27 kg/m2) to prevent the development of type 2 diabetes.

It is not recommended to use over-the-counter medications that are not approved by international documents for weight control. For overweight individuals who require pharmacotherapy due to other pathological conditions, it is recommended to choose medications that are not associated with weight gain.

As of April 5, 2025, 3 dosage forms with the active substance liraglutide are registered in the State Register of Medicinal Products of Ukraine, these are such drugs as: "Xaltofay" (ATX Code A10AE56), "Saxenda" (ATX Code A10BJ02), "Victoza" (ATX Code A10BJ02).

For the active ingredient orlistat, 2 trade names have been registered: "Orlip" (ATX Code A08AB01), "Xenical" (ATX Code A08AB01). There is also one registered homeopathic preparation, Cefamadar (ATX Code A08A X10*), 1 tablet of which contains 250 mg of Madar trit. D4 [57]

Currently, no drug containing the combination of naltrexone/bupropion is registered in the State Register of Medicines, but there is one registered drug with the active ingredient bupropion with the trade name "Buprinol".

Also, we can highlight such a medicinal substance as phentermine, which is also used to treat obesity in various countries, but is not registered in Ukraine.

Phentermine is the most commonly prescribed weight loss medication in the United States. Recent studies have shown that phentermine is effective in helping people lose weight, and has been associated with the greatest weight loss compared to other methods. It has also been shown to be one of the most cost-effective weight loss strategies [58].

Lorcaserin, also known as Belviq, is a selective serotonin 5-HT2C receptor agonist. This drug was approved by the FDA for weight management in 2012. It is

used as a weight loss agent in combination with lifestyle modifications to reduce weight [59].

Studies of lorcaserin have been conducted to investigate its pharmacology, pharmacokinetics, and safety. Initial studies focused on its effects on food intake, body weight gain, and appetite. However, subsequent studies have expanded to include the effects of lorcaserin on eating behavior, binge eating, and drug-related and addictive behaviors. Potential effects of lorcaserin on pain and seizure activity have also been identified [60].

Orlistat is one of the first drugs developed for the treatment of obesity. It is a semisynthetic derivative of lipstatin, which was approved for the treatment of obesity in many countries in 1998–1999 Orlistat is a potent inhibitor of pancreatic lipase, an enzyme that breaks down dietary triglycerides into fatty acids.

Orlistat works by slowing and inhibiting this process, preventing the conversion of triglycerides into fatty acids that can be absorbed. About 30% of the absorbed triglycerides are excreted from the body, mainly as calories. This leads to a reduction in the number of calories consumed [61].

It is important to note that orlistat does not directly affect appetite or satiety mechanisms. It works by reducing the absorption of fatty acids from food, which helps reduce calorie intake. To date, orlistat is the only obesity drug that works in this way. Orlistat has been approved by the Ministry of Health as a means of reducing or preventing weight gain after previous weight loss in patients with a BMI ≥ 30 kg/m2 or a BMI ≥ 27 kg/m2 with comorbidities (e.g., hypertension, type 2 diabetes, dyslipidemia). The approved dose is 120 mg three times daily with or within 1 hour after meals.

In the 2-year and 4-year studies , orlistat and placebo groups were given a hypocaloric diet in addition to treatment. After analysis of the results of five 2-year studies, it was found that 37% of orlistat-treated patients lost at least 5% of their body weight during the 12 weeks of treatment, compared with 19% of placebo-

treated patients. Of these, 49% of orlistat-treated patients and 40% of placebo-treated patients lost more than 10% of their body weight during the first year of treatment

After one year of treatment, 20% of patients in the 120 mg orlistat group lost 10% or more of their body weight, compared with 8% of patients in the placebo group. The mean difference in weight loss between orlistat and placebo patients was 3.2 kg. These results suggest that orlistat, when combined with a hypocaloric diet, can promote significant weight loss in obese patients [62].

However, orlistat treatment is associated with significant gastrointestinal effects, including greasy stains on underwear, greasy stools, flatulence, and increased frequency and urgency of bowel movements. These side effects may lead to discontinuation of treatment in patients who are unwilling to limit their dietary fat intake. The Canadian Longitudinal Analysis of Obesity Treatment [79] showed that 18%, 6%, and 2% of patients were receiving orlistat after 6 months, 1 year, and 2 years, respectively. Orlistat interferes with the absorption of fat-soluble vitamins, namely A, D, E, and K. Patients should be informed of this and advised to take a multivitamin at least 2 hours before or after taking orlistat [63].

It is important to note that orlistat is contraindicated in patients with chronic malabsorption syndrome or cholestasis (impaired bile flow) Some patients may experience increased urinary oxalate concentrations when using this drug [64].

Orlistat may interfere with the absorption of levothyroxine (a thyroid medication) and/or iodized salt. Thyroid function should be monitored in patients receiving levothyroxine, as orlistat may interfere with its proper absorption. Cyclosporine blood levels have also been reported to decrease with orlistat, and patients receiving cyclosporine should have their levels monitored more frequently

Orlistat may also interfere with the absorption of anticonvulsants, and patients receiving such medications should be closely monitored for changes in seizure frequency and severity. It is important to note that orlistat did not significantly reduce body weight compared with placebo, but its use was complicated by

gastrointestinal side effects, which limited its routine use in patients with hyperthyroidism (an overactive thyroid gland) or in obese patients [65].

Therefore, when prescribing orlistat to patients, the possibility of interactions with other medications should be considered, thyroid function should be monitored, and side effects should be monitored.

Liraglutide is a leader in obesity therapy. It is a long-acting glucagon-like peptide-1 receptor (GLP-1R) agonist that stimulates insulin secretion and accelerates satiety, prolongs satiety, and suppresses hunger for weight loss [66,67].

In addition, liraglutide temporarily delays gastric emptying, stimulates insulin release, and suppresses glucagon when glucose levels rise, which is why the drug was approved by the FDA in 2010 for the treatment of type 2 diabetes. The daily dose is 1.2 or 1.8 mg. In 2019, an expanded indication was received for children aged 10 years and older with type 2 diabetes. In 2014, liraglutide 3.0 mg was approved by the FDA for the treatment of obesity. In 2015, the drug was approved in many countries for the long-term treatment of obesity in adults with and without type 2 diabetes at a daily dose of 3.0 mg [68]. In Ukraine, where liraglutide was registered in 2021, the recommended starting dose is 0.6 mg per day with subsequent titration by 0.6 mg every week until the target dose of 3.0 mg per day is reached.

The most common side effect of liraglutide is nausea, due to temporary inhibition of gastric emptying. Patients also experience constipation, diarrhea, palpitations, and vomiting. Slow dose titration helps reduce gastrointestinal side effects. Liraglutide increases the risk of gallstones by 1.4% compared to placebo.

In addition, liraglutide does not significantly increase the risk of pancreatitis compared with placebo. Most of these cases occur in patients with cholelithiasis. Liraglutide is contraindicated in patients with a personal or family history of medullary thyroid carcinoma or a personal history of multiple endocrine neoplasia type This is because experimental studies of the drug in rodents have shown an

increased risk of medullary thyroid cancer. There were no cases of medullary thyroid cancer in human clinical trials.

2.3. Dietary supplements as an aid in combating obesity

Dietary supplements are considered an attractive alternative to conventional therapy due to their low toxicity and accessibility to a wide range of populations. Almost 33.9% of adults trying to lose weight, predominantly young people, women, and those from lower socioeconomic groups, use dietary supplements [69].

According to the Law of Ukraine “On Basic Principles and Requirements for the Safety and Quality of Food Products” , it is stated that “dietary supplement - a food product consumed in small, defined quantities in addition to the usual diet, which is a concentrated source of nutrients, including proteins, fats, carbohydrates, vitamins, minerals (this list is not exclusive), and manufactured in the form of tablets, capsules, dragees, powders, liquids or other forms”[70],

Weight control food product - a specially designed and manufactured food product intended for consumption while following a low-calorie diet for weight loss, which, when consumed in accordance with the instructions of the market operator, replaces the daily diet [71].

Dietary supplements also contain or include various substances or mixtures of substances, including protein, carbohydrates, amino acids, edible oils, and extracts of plant and animal materials, that are considered essential or beneficial for human nutrition and general health. Dietary supplements are not offered alone to treat a disease, but they should act synergistically with other treatments to promote weight loss [72].

Furthermore, when choosing dietary supplements, various factors must be considered, the most important of which are its quality, the patient's overall lifestyle (e.g., eating habits and exercise), other conditions related to the patient's health (e.g., comorbidities and nutritional status), precise dosage, food-drug interactions, absorption profiles, and potential side effects

Dietary supplements for weight loss or weight control may act through several mechanisms, including reducing lipogenesis, appetite, and nutrient absorption, or increasing lipolysis and energy expenditure, but dietary supplements and alternative therapies for weight loss have a limited evidence base for effectiveness. Physicians and patients should be aware of the scientific evidence before recommending their use [73].

The field of research on the component composition of dietary supplements is quite diverse and has been covered in a number of scientific studies. For a more complete description of the issue under consideration, works on the component composition of dietary supplements and the mechanisms of action and feasibility of including in the composition of dietary supplements such substances as β-glucans, calcium + vitamin D, chitosan, chromium, conjugated linoleic acid, forskolin, guar gum, Hoodia gordoni, Garcinia cambogia were studied. [74].

In a study of the role of β-glucans in weight loss, researchers found that these substances are not digested in the body, but are easily fermented by the intestinal microbiota in the large and small intestines. As a result, β-glucans become soluble fibers that can increase satiety by delaying the passage of food through the gastrointestinal tract, as well as reducing glucose absorption. The weight loss effect of β-glucans was discovered as a secondary result of clinical trials aimed at evaluating the effects of these substances on other health conditions, such as insulin resistance, high blood pressure and dyslipidemia. That is, although the primary goal of the study was not weight loss, β-glucans were found to have a beneficial effect on weight loss, probably through their effects on appetite and metabolism in the body [75].

In a controlled trial involving overweight and obese college students, the effect of inadequate calcium intake on weight gain and obesity was examined. Fifty-three subjects participated in the study, half of whom were instructed to follow a calorie-restricted diet (-500 kcal/day) supplemented with 600 mg elemental calcium and 125 IU vitamin D3, or energy restriction alone for 12 weeks

for the other half. Significantly greater reductions in fat mass loss were observed in the calcium+vitamin D supplement group (-2.8±1.3 vs. -1.8±1.3 kg; P=0.02) than in the control group. The investigators concluded that calcium+vitamin D3 supplementation for 12 weeks facilitated loss of body fat and visceral fat in conjunction with energy restriction in overweight or obese subjects.

Another ingredient that is also commonly found in dietary supplements is chitosan, a natural marine polysaccharide fiber derived from the exoskeletons and shells of crustaceans that exerts a bile acid sequestering or resin effect, reducing cholesterol absorption [76]. Its mechanism of action for weight loss may involve binding fat molecules in the intestine, preventing their absorption. It is currently available for the treatment of conditions such as obesity, hypertension, and hypercholesterolemia. A meta-analysis by Ernst and Pittler showed a statistically significant weight loss (2.38 kg) after taking chitosan for 28 days [77]. A Cochrane meta-analysis of 13 clinical trials of chitosan showed a statistically significant weighted mean difference in body weight (1.7 kg) between the chitosan-supplemented and placebo-supplemented groups [78].

Chromium is also considered an essential trace element, found in small amounts in various foods. It is also taken as a dietary supplement, particularly for weight loss. This element plays an important role in the metabolism of amino acids, glucose, and lipids through its effects on insulin. It can directly increase serotonin activity and regulate its subsequent effects on dopaminergic signaling at central insulin receptors. Chromium is thought to affect multiple pathways involved in the central control of satiety, energy homeostasis, and food intake by modulating these neurotransmitters Chromium has been shown to reduce body weight while preserving lean mass, and is therefore often used by manufacturers of dietary supplements for weight loss [79,80].

Forskolin is a biologically active compound extracted from the root of Coleus forskohlii and is a potent cAMP stimulator that activates hormone-sensitive lipase, which causes the release of fatty acids from adipose tissue. A few limited

clinical studies have investigated its effects on weight loss and have found a greater effect in men than in women. A placebo-controlled, double-blind clinical study of the effects of forskolin on body weight loss in 15 obese men who took 500 mg/day of forskolin extract (10%) for 12 weeks found a significant reduction in body fat in the forskolin group and an increase in lean body mass without any side effects, although basal metabolic rate remained unchanged/These results suggest the potential benefits of forskolin in reducing body weight. However, it is important to note that the study was conducted on a small number of participants, and further research is needed to confirm these results and determine the optimal dosage and duration of forskolin use. It is always recommended to consult a doctor before starting any weight loss program or taking any dietary supplements [81].

Conjugated linoleic acid is a naturally occurring essential omega-6 fatty acid derived from linoleic acid, which is found primarily in meat and dairy products. Animal studies have shown its multiple beneficial effects, including immune enhancement, reduction of biomarkers of atherosclerosis, and changes in body composition (decreased fat mass and increased muscle mass). In humans, dietary supplementation with conjugated linoleic acid may improve insulin sensitivity and lipid metabolism, reducing plasma triglycerides and low-density lipoprotein cholesterol. Scientists fromNovartis Consumer Health Ltd, Nyon, Switzerland was dConjugated linoleic acid has been shown to reduce hunger in adults without noticeable side effects [82].

Another substance that has recently received a lot of research attention for its effects on obesity and overweght is guar gum, a dietary fiber obtained from the seeds of the plant Cyamopsis tetragonolobus, which consists of high-molecular-weight galactomannan polysaccharides in linear, β-1,4-linked D-mannopyranosyl chains with α-1,6 D-galactopyranosyl side chains .Guar gum may induce weight loss due to its intestinal bulking properties, which delay gastric emptying [52-A study by Kyoto Prefectural Medical University is the first to show a preventive

effect of guar gum on sarcopenic obesity by altering the absorption of nutrients from the intestine. [83].

Among the substances commonly found in DD, one can single out the plant Hoodia gordonii, which is a leafless succulent plant with medicinal properties that is naturally found in Namibia, Botswana, and South Africa. South African researchers at the University of Stellenbosch have studied Hoodia gordonii as a weight loss aid due to its appetite suppressant properties, although its use has been questioned due to a number of side effects, including nausea and skin reactions . P57 is an oxypregnane steroidal glycoside isolated from the African cactiform Hoodia gordonii. Studies of the effects of P57 in vivo have shown that intraventricular injection of purified P57 in rats reduces food intake and significantly increases ATP production in the hypothalamus, which may reduce the appetite response. According to an in vitro study, P57 stimulates cholecystokinin secretion in human enteroendocrine cells, while cholecystokinin has been studied to understand its appetite suppressant effect via the vagus nerve. However, since oral administration of Hoodia gordonii is known to cause gastric degradation of P57, the extract must be taken in high doses to obtain significant clinical effects [85].

According to researchers at the Australian University of Health and Medicine , garcinia cambogia also has many beneficial properties for the body, including anti-inflammatory, antitumor, hypolipidemic and antidiabetic effects. One of the active components of garcinia, hydroxycitric acid, found in its peel, plays an important role in weight control

Hydroxycitric acid works by inhibiting the enzyme extramitochondrial citrate lyase, or ATP-citral lyase. This enzyme affects the synthesis of cholesterol and fatty acids in the body’s cells. By inhibiting this enzyme, hydroxycitric acid may reduce the formation of fatty acids and affect the process of lipogenesis, which is the accumulation of fat. Therefore, garcinia cambogia, and in particular its active

ingredient, hydroxycitric acid, may have potential benefits for people who want to lose weight or control their weight [86].

A recent study examining the anti-obesity effects of pineapple juice in male rats suggested that pineapple may be beneficial in the treatment of obesity and dyslipidemia. This is due to its high content of bromelain, an active enzyme that plays an important role in the breakdown of fats and may reduce the risk of cardiovascular disease. Therefore, a study was conducted to investigate the effects of pineapple juice on obesity in rats induced by a high-fat diet. The study also aimed to uncover the mechanisms underlying this effect by analyzing the expression of genetic information of enzymes related to fat metabolism [87].

The results of this study support the potential benefits of pineapple juice in weight management and obesity treatment. The bromelain content helps break down fats, and the dietary fiber in pineapple reduces cholesterol absorption. All of these may have positive effects on heart health and the body's overall ability to break down fats [88].

Currently, there is no register of dietary supplements in Ukraine, therefore, online sources such as tabletki.ua, compendium.com.ua, and official websites of online pharmacies were used as sources for analyzing the range of dietary supplements.

By analyzing publicly available Internet sources, it was determined that upon request for dietary supplements for weight loss and appetite control, at least 227 names of dietary supplements for weight control and reduction are available on the pharmaceutical market of Ukraine. This group of products can be divided into three groups, namely: detox therapy, products that promote fat burning.

During the analysis of the pharmacosupply of dietary supplements for weight control and reduction, we examined 63 names of dietary supplements for weight loss and appetite control offered by pharmacies in Odessa.

Among the subgroup of detox therapy, 40 names of DD were analyzed during the study. The analyzed group is represented by 4 forms of release, namely vegetable

fiber, tablets, capsules and herbal teas. The vast majority belongs to a multicomponent mixture of plant origin (herbal teas) - 20 assortment items, 12 items belong to vegetable fiber in the form of powders or seeds, 5 in the form of tablets, and 3 items are capsules. The price range of this group is from 15.60 UAH to 854.60 UAH per package.

The next step was to analyze the component composition and frequency of use of various active substances for the manufacture of detox therapy products. It was found that 30 items of this group are polycomponent (from 3 to 9 ingredients are included in the composition), and 10 items of this subgroup are monocomponent, which represents 25% of the total number of analyzed items.

Having considered the frequency of use of active substances, a table (See Table 2/1) was compiled for a sample of 40 names of DD. It was determined that for the manufacture of detox therapy products, manufacturers used 45 types of substances, namely 7 types of fiber, 6 types of extracts, 28 types of medicinal plant raw materials and 4 types of substances of different origin, such as microcrystalline cellulose, guar gum, zinc and apple cider vinegar powder. In total, various active substances were used 143 times. LRS was used most often - 98 times (68%), plant fiber was found 17 times, which is 12%, extracts were used 20 times (14%), and substances of different origin 8 times (6%).

Table 2.1

Frequency of use of substances in products for detox therapy.

Active ingredient	**Frequency of use (times)**
Cellulose	
Milk thistle fruit	4
Oat grains	4
Flax seeds	3
Pumpkin seeds	2
Plantain	2

Luffa fruit fibers	1
Wheat germ	1
Extracts	
Green tea extract	8
Pineapple extract	7
Maitake / Pleurotus (Oyster Mushroom) Extract.	2
Grape seed extract	1
Garcinia extract	1
Cranberry extract	1
Medicinal plant raw materials	
Cassia seeds and leaves	18
Sudanese mallow flowers	8
Nettle leaves	7
Buckthorn bark	7
Sporysh grass	7
Corn cobs and stigmas	6
Lemongrass grass	5
Horsetail grass	5
Rosehip fruits	5
Ginger root	4
Lemon fruits	4
Mate tea leaves	4
Rowan berries	2
Fennel fruits	2
Ground green coffee	2
Horsetail and licorice roots	1
Chamomile flowers	1

Bark and fruits of the joster	1
Leaves of the shrubby banyan tree	1
Hawthorn fruits	1
Black elderflower	1
Cherry fruits	1
Lingonberry leaves	1
Goji berries	1
Beetroot	1
Lotus flowers	1
Laminaria	1
Other substances	
MCC	3
Guar gum	2
Zinc	2
Apple cider vinegar powder	1

So, among the most common fiber, milk thistle fruits and oat grains were most often found, which have a hepatoprotective effect and improve liver function and normalize digestion. Among the extracts, the leaders were green tea extract - in 8 samples, and pineapple extract - in 7 samples, which have a positive effect on weight loss and have anti-inflammatory and antibacterial effects. In the LRS sample, the absolute leader in frequency of use was cassia seeds and leaves, in 16 samples, which has a laxative, diuretic and tonic effect. Sudanese mallow flowers were also often found - 8 times, which is a good immunostimulant . Substances of different origin were found the least, but among them, microcrystalline cellulose was most often used - 3 times, which provides the intestines and removes toxins and toxins from the body.

Having considered dietary supplements from the subgroup of products that promote fat burning, 23 names of dietary supplements were analyzed. The analyzed group is represented by 3 forms of release, such as capsules, tablets, powders. The vast majority belongs to capsules - 14 assortment items, the rest are tablets - 7 items and powders - 2. The price range of the group is from 41.58 UAH to 680.85 UAH per package.

After analyzing the component composition of products that promote fat burning, it was noted that 18 items in this subgroup are multicomponent, and 5 are monocomponent products, which represents only 21% of the total number of analyzed items in this category.

Having considered the frequency of use of active substances (See. Table 2/2) for a sample of 23 names of dietary supplements, it was determined that 42 types of substances were used to produce products that promote fat burning, namely 11 different vitamins, 12 types of extracts, 10 names of LRS, 5 different trace elements, 3 positions of amino acids and 6 types of substances of different origin. In total, different active substances were used 90 times. Extracts were used most often - 28 times (31%), LRS were used 18 times (20%), vitamins were also found 18 times (20%), trace elements - 10 times (12%), amino acids - 9 (10%), and substances of different origin 8 times (7%).

Table 2.2

Frequency of use of substances in the composition of products, promoting fat burning

Active ingredient	Frequency of use
Vitamins	
Vitamin B4 (Choline)	5
Vitamin D3 (Cholecalciferol)	2
Vitamin C (Ascorbic Acid)	2
Vitamin E (Tocopherol acetate)	2

Vitamin A (Retinol)	1
Vitamin B1(Thiamine)	1
Vitamin B2(Riboflavin)	1
Vitamin B5 (Pantothenic acid)	1
Vitamin B6 (Pyridoxine)	1
Vitamin B7 (Biotin)	1
Vitamin B12 (Cyanocobolamine)	1
Extracts	
Garcinia extract	6
Guarana extract	6
Bromelain (pineapple)	5
Green tea extract	3
Ginger extract	1
Sacilia extract	1
Ginemosa extract	1
Baikal skullcap extract	1
Forsythia drooping extract	1
Goji berry extract	1
Carob tree extract	1
Asparagus rhizome extract	1
Medicinal plant raw materials	
Hoodia gordonii fruits	4
seaweed - fucus	3
Chinese yam root	2
Hawthorn fruits	2
Guatsuma ulmosa leaves	2
Rhubarb root	1

Pericarp of Dixon palm	1
Horse chestnut seeds	1
Long pepper	1
Dioscorea root	1
Micronutrients	
Chrome	5
Copper	2
Manganese	1
Iodine	1
Zinc	1
Amino acids	
L-carnitine	7
L-methionine	1
L-tyrosine	1
Other substances	
Forskolin	2
Chitosan	2
7-keto-dehydroepiandrosterone	1
Phenylalanine	1
Conjugated linoleic acid	1
Inulin	1

So, in the course of our study, we came to the conclusion that the most common among vitamins was Vitamin B4 (choline), the main pharmacological action of which is to stimulate brain function and increase concentration, and Vitamin D3 (cholecalciferol), which, based on research conducted by scientists [66], has a beneficial effect on weight loss. Among the extracts used by manufacturers, the most common were garcinia extract, which suppresses hunger and promotes fat

burning, and guarana extract, which has a stimulating effect and fights psychophysical fatigue. Hoodia gordonii fruits and chromium were leaders among their subgroups, the positive effects of which on weight loss have been proven by many studies.

The legislation of Ukraine, namely the Order of the Ministry of Health of Ukraine No. 1114 dated 19.12.2013 “On Approval of Hygienic Requirements for Dietary Supplements” defines quality criteria for nutrients used for the production of dietary supplements; the minimum content of each vitamin or mineral; the maximum content of individual nutrients; requirements for labeling and advertising of dietary supplements. [89]

In Appendix No. 9 to the Law of Ukraine No. 2639-VIII of December 6, 2018"On information for consumers on food products" specifies daily reference values for the consumption of vitamins and minerals [90].(See Table 2.3)

Table 2.3.

Daily reference values for the consumption of vitamins and minerals according to the Law of Ukraine of December 6, 2018 No. 2639-VIII

Vitamin A (mcg)	800	Chlorides (mg)	800
Vitamin D (mcg)	5	Calcium (mg)	800
Vitamin E (mg)	12	Phosphorus (mg)	700
Vitamin K (mcg)	75	Magnesium (mg)	375
Vitamin C (mg)	80	Iron (mg)	14
Thiamine (mg)	1.1	Zinc (mg)	10
Riboflavin (mg)	1.4	Copper (mg)	1
Niacin (mg)	16	Manganese (mg)	2
Vitamin B6 (mg)	1.4	Fluoride (mg)	3.5
Folic acid (mcg)	200	Selenium (mcg)	55
Vitamin B12 (mcg)	2.5	Chromium (mcg)	40

Biotin (mcg)	50	Molybdenum (μg)	50
Pantothenic acid (mg)	6	Iodine (mcg)	150
Potassium (mg)	2000		

The legislation of Ukraine on providing consumers with information about food products consists of the Constitution of Ukraine, the laws of Ukraine On the basic principles and requirements for the safety and quality of food products, "On state control over compliance with legislation on food products, feed, animal by-products, veterinary medicine and animal welfare", "On information", "On access to public information" and other acts of legislation containing provisions on providing consumers with information about food products.

According to Article 37 of the Law of Ukraine No. 771/97-VR of 23.12.1997 "On the Basic Principles and Requirements for the Safety and Quality of Food Products" (the Law), the only document that must accompany objects of sanitary measures during their transportation (shipment) not related to the implementation of export or import operations is the consignment note, unless otherwise provided by law. In turn, the Law determines that the objects of sanitary measures are food products, auxiliary materials for processing, objects and materials in contact with food products.

Since, according to the legislation of Ukraine, dietary supplements are a food product, during their transportation (shipment), unless otherwise provided by law, dietary supplements must be accompanied only by a consignment note.

At the same time, according to Part 8 of Article 20 of the Law, market operators are prohibited from "circulating food products obtained from facilities that have not passed state registration or have not received an operating permit in accordance with this Law, and/or using such food products in the production of other food products." It should be noted that according to Article 23 of the Law, an operating permit is obtained by market operators carrying out activities related to

the production and/or storage of food products of animal origin, with the exception of market operators carrying out:

- primary production of food products of animal origin, as well as related activities, in particular the storage and handling of primary products at the place of primary production, provided that the condition of such products is not significantly changed;
- transportation of food products of animal origin, including those that require temperature control and cannot be stored at temperatures above 10 °C while remaining suitable for human consumption;
- storage of food products of animal origin that do not require temperature control and can be stored at temperatures above 10 °C while remaining suitable for human consumption;
- production and/or storage of food products whose ingredients are exclusively products of plant origin and/or processed products of animal origin;
- operation of public catering establishments and retail establishments that meet the requirements established by the Cabinet of Ministers of Ukraine. Until such requirements are established, this exception applies to all public catering establishments and retail establishments.

The Law also stipulates that facilities for the production and/or circulation of food products, for which an operating permit is not required, are subject to state registration. Article 32 of the Law establishes that food products in circulation on the territory of Ukraine must comply with the requirements of legislation on safety and certain quality indicators of food products. It is also stated that certification of food products is optional.

Therefore, the presence of a quality certificate when accepting goods at a pharmacy is not mandatory. Thus, the supplier of DD must provide business entities with: a consignment note; a copy of the operating permit (if the product contains ingredients of animal origin) or a copy of the decision on state registration of the

facility; if information about the food product is not indicated on the packaging or attached label, accompanying documents indicating such data.

The current issue remains information for consumers, which should be on the packaging of DD. In accordance with Part 6 of Article 5 of the Law of Ukraine "On Information for Consumers on Food Products" dated 06.12.2018 No. 2639-VIII, food market operators within the scope of their activities are obliged to ensure the availability of mandatory information about food products in accordance with Articles 6 and 7 of this Law on the packaging of food products or on labels attached to them, or in accompanying documents. Article 22 of the Law establishes that a food product may be put into circulation and be in circulation only if its labeling contains a designation identifying the batch to which such food product belongs.

Based on the study of regulatory documentation regarding the circulation of DD,It should be noted that when manufacturing and supplying DD, manufacturers must comply with the requirements of the Legislation of Ukraine, namely, indicate the quantitative content and not exceed the daily reference intake values, and follow the established norm of at least 15% of the recommended daily intake of a vitamin or mineral.

2.5. Conclusions to chapter № 2

1. In recent years, various countries around the world, including Ukraine, have been actively paying attention to the problem of obesity and developing regulatory documents aimed at combating this condition.

2. The main principles of pharmacotherapy of obesity are based on the use of certain drugs. Among the drugs for combating obesity in Ukraine, 3 dosage forms with the active ingredient liraglutide are available and registered, these are such drugs as: "Xaltofay" (ATX Code A10AE56), "Saxenda" (ATX Code A10BJ02), "Victoza" (ATX Code A10BJ02). For the active ingredient orlistat, 2 trade names are registered: "Orlip" (ATX Code A08AB01), "Xenical" (ATX Code A08AB01).

3. Dietary supplements for the prevention of obesity are also available on the pharmaceutical market. Our analysis of the component composition of dietary

supplements is important because it allows us to assess the presence of active substances and their effect on weight loss and possible risks of allergic reactions or interactions with other drugs.

4. Knowledge about the composition and action helps patients make informed choices and increase safety when using DD.

5. Summarizing the results obtained, the dietary supplements available on the pharmaceutical market of Ukraine do contain substances that can promote weight loss and affect metabolism. However, one should be careful and remember that their effectiveness and safety may vary, and it is necessary to refer to evidence-based information and consult a specialist before using them.

6. The pharmaceutical market of Ukraine has a large number of drugs and dietary supplements for the treatment and prevention of obesity, and therefore medical and pharmaceutical specialists have the opportunity to provide high-quality treatment of this disease.

CHAPTER 3. THE ROLE OF PHARMACISTS AND WAYS OF ENGAGING THE COMMUNITY IN COMBATING OBESITY

3.1. World experience in involving pharmaceutical workers in the fight against obesity

The development and implementation of preventive measures aimed at combating obesity are strategically important in many countries around the world. In an attempt to attract the attention of the pharmaceutical community to the problem of obesity, governments and scientists in different countries have implemented various incentive measures over the past 20 years. The success of these programs varies, but nevertheless, attempts to implement such programs do not cease, and every year there is more and more discussion on this topic.

The effectiveness of these strategies depends largely on the level of knowledge of medical and pharmaceutical professionals in the field of nutrition and physical exercise, as well as their ability to influence patients' behavior and maintain

their motivation for a healthy lifestyle. Professionally knowledgeable nutritionists can provide patients with specific advice on balanced nutrition and weight control.

In an evaluation of the Counterweight program, which was introduced in Scotland in 2009, researchers from the University of Glasgow investigated the effectiveness of weight management using pharmacists. Pharmacists were trained by dieticians to deliver the Counterweight program as part of the Keep Well project. The program targeted middle-aged adults at high risk of cardiovascular disease and aimed to improve their health and reduce weight.

The program involved 16 pharmacies and 458 patients with a mean BMI of 36.0 kg/m2. The design involved nine separate visits over a 12-month period. During these visits, pharmacists counseled patients on their diet and weight management strategies, and measured their weight. 314 patients (68.6%) successfully completed the program, and 41.6% who attended all program meetings lost at least 5% of their initial body weight. However, when patients who remained in the program but did not attend all meetings were included, this percentage decreased to 10.2% [91].

Although the researchers were unable to analyze subsequent weight maintenance in detail, this study suggests that weight management programs implemented by pharmacists may be successful for some patients if they adhere to the program interventions on an ongoing basis.

A small study conducted in a community pharmacy in the United States aimed to investigate the impact of pharmacists on obesity prevention. Over a 6-month period, 12 patients underwent a series of 14 15-minute visits during which they were provided with information on diet, exercise, and nutrition. The program was designed according to the principles of the Centers for Medicaid and Medicare Services' Decision-Making Guideline for Intensive Behavioral Therapy for Obesity

During the first and last sessions, a pharmacist conducted weekly or biweekly visits during which height, weight, waist circumference, body fat composition, and dietary history were measured. Overall, 11 of 12 participants successfully completed the program and showed positive changes. They reduced their body weight

(P<0.001), visceral fat (P=0.024), waist circumference (P=0.002), and body mass index (P<0.001) from baseline. However, this study was small in size and limited by patient demographics, so its results should be interpreted with caution [92].

A program called the Lifestyle Challenge, which involved a physician with expertise in nutrition, a pharmacist, and a behavioral psychologist, was implemented at the State University of New York Outpatient Clinic. The program was aimed at adults at high risk for obesity-related comorbidities and with a body mass index greater than 27 kg/m2 .

Patients enrolled in the program attended 20 weekly one-hour educational sessions, where they were given instructions on diet, exercise, and behavior modification. Periodic clinical assessments were also conducted. Mid- and final examinations were conducted after 10 and 20 weeks. The physician and psychologist's involvement included conducting initial intake interviews, where data on medical history, baseline laboratory values, and psychological assessments were collected. A pharmacist performed routine clinical assessments, measured parameters such as weight, height, and waist circumference, and analyzed the data.

A total of 90 patients participated in the program, of whom 59 (65.6%) completed all 20 weeks. A mean body weight loss of 4.8% (P=0.052) was observed compared to baseline. Significant improvements in psychological assessments were also noted [93]. This study suggests that collaborative multidisciplinary practices involving pharmacists may promote successful weight management for obese patients, although these results are limited.

In Australia, a large and comprehensive collaborative program was conducted in which a small group of 40 patients with risk factors for chronic diseases were offered a healthy lifestyle program. The program included a comprehensive medication review by a pharmacist, free gym membership, access to cooking classes, supermarket tours, and nutritional advice from a registered dietitian. Selected patients were also provided with prepaid GP visits and assistance with creating a home garden [94].

Body weight, waist circumference, and fruit and vegetable intake were measured at the beginning and end of the one-year program. At the end of the study, patients significantly reduced body weight and waist circumference ($P<0.001$) and significantly increased fresh fruit and vegetable intake and weekly physical activity compared with baseline .

In our view, this integrated approach is a promising and effective model for obesity prevention, but its implementation depends on the willingness of staff to invest their time. In addition, this model requires the collaboration of many different professionals and resources, which complicates the individual role of the pharmacist in obesity interventions. However, it shows that when used appropriately, pharmacists can be useful and helpful in obesity management programs.

The most recent study, conducted in Qatar in 2021, examined the role of pharmacists in the fight against obesity and NMD. First, an online survey of pharmacists was conducted to collect quantitative data from study participants. This was followed by qualitative individual and focus group discussions, where participants had the opportunity to elaborate on their thoughts and experiences.

The study surveyed 270 community pharmacists. The majority of pharmacists (56.2%) reported that they often or always explain the risks of NMT and obesity to patients. More than half of pharmacists (52.4%) also recommend medications, herbs, or supplements for weight loss, and 56.9% provide advice on their proper use and possible side effects.

On the other hand, most pharmacists rarely or never measure patients' waist circumference (83.8%) or calculate body mass index (72.1%). Despite this, over 80% of pharmacists had a very positive view of their role in weight management. Around three-quarters of the study participants strongly agreed that the main barriers to implementing weight management services were difficulties in following up with patients (80.7%), lack of private consultation areas (75.7%) and lack of time for pharmacists (75.2%). Around 60% of pharmacists stated that they were fully competent in 7 out of 24 aspects of weight management listed [95].

As a result, several strategies have been proposed to overcome these barriers and improve the delivery of weight management services in community pharmacies in Qatar. For example, training and professional development programs for pharmacists in weight management can be developed. It is also important to create an enabling environment for pharmacists by providing them with the necessary infrastructure, including private consultation areas. Additionally, social media can be used to support and spread awareness among patients about weight management [85]. These strategies aim to create an enabling environment for pharmacists and ensure their competence so that they can effectively provide weight management services and contribute to the health of the community.

Based on the studies provided, it can be concluded that the pharmacist as a nutrition expert in the context of healthy lifestyle and obesity management programs is important. Overall, the studies suggest that pharmacists can play an important role in healthy lifestyle and obesity management programs. They can provide the necessary knowledge, support and motivation for patients to change their diet and lifestyle and be valuable members of the professional team that deals with patients' health and weight and make a significant contribution to achieving healthy lifestyle goals.

3.2. A study of pharmacists' awareness of the problem of obesity.

The importance of such research cannot be overstated. Obesity is a serious global health problem that has a significant impact on the quality of life and health of people. In this regard, the role of pharmacists in the prevention and treatment of obesity is critically important.

First of all, pharmacists are the most accessible healthcare professionals for many people. They are located in pharmacies and often interact with customers, providing advice on health and medication issues. Therefore, pharmacists must have sufficient knowledge about obesity and healthy lifestyles to provide professional care and support to patients.

Analyzing pharmacists' awareness of obesity will help to identify possible gaps in their understanding of the problem. This will allow the development of a targeted educational program aimed at improving pharmacists' knowledge of obesity, its causes, consequences and management strategies. In addition, the analysis may identify potential barriers or shortcomings in the approaches used by pharmacists in their practical work. This study may also contribute to increasing the authority of the pharmaceutical profession in the field of obesity and healthy lifestyles. Increasing pharmacists' knowledge and their active participation in obesity interventions can contribute to greater patient confidence and increased motivation for a healthy lifestyle. Pharmacists can become important members of the obesity management team and contribute to achieving better outcomes for patients.

In order to develop a program aimed at improving knowledge about obesity, we conducted a survey to assess pharmacists' awareness of this issue.

The survey was conducted during March 2025 among pharmacists of various pharmacies in Odessa and consisted of 6 questions related to the socio-demographic characteristics of the respondents and 18 questions regarding:

- General competence of pharmacists in the treatment, prevention and causes of obesity;
- Statistical indicators of demand and questions regarding consulting customers about drugs and dietary supplements for weight loss;
- Questions about the feasibility of implementing additional services to help obese patients.

During this period, responses were received from 86 respondents. The socio-demographic characteristics, length of service, and place of work of the respondents are listed in Table 2.4.

Table 2. 4.

Socio-demographic and other characteristics of respondents

Characteristic	Number of respondents (persons)	Number of respondents (percentage)
Age		
18-25	36	42.9%
26-35	33	37.4%
36-45	13	13.3%
46-60	4	6.3%
Sex		
Women's	82	93.3%
Men's	6	6,9%
Education		
Higher pharmaceutical education	52	63.4%
Secondary pharmaceutical education	34	35.6%
Work experience		
Up to 5 years	42	44.8%
From 5 to 8 years	28	33.6%
Over 8 years	16	21.6%
Place of work		
Pharmacy in a shopping mall or supermarket	9	9.5%
Pharmacy in the hospital	4	5.7%
Pharmacy in a residential area	61	60.9%
Pharmacy located elsewhere	12	33.9%

Among the questions regarding the general competence of pharmacists in the treatment, prevention and causes of obesity, 20% of respondents described their competence in the field of healthy eating and obesity prevention as low, 50% defined

their knowledge as average, and 30% of respondents assessed their competence as high.

As a key method for determining the degree of obesity, 100% of respondents mentioned the BMI indicator, and 77.2% of respondents noted the measurement of waist and hip circumference. 96.7% of respondents consider excessive food consumption and lack of physical activity to be the main cause of obesity, and genetic factors were mentioned by 71.4% of respondents. In response to the question "What treatment methods do you think are the most effective?", the absolute majority of respondents noted complex therapy - 86.2%, the answer diet was noted by 80% of respondents, and the most ineffective method, according to the pharmacists surveyed, is behavioral therapy - this option was noted by only 32.6%.

From the group of questions related to knowledge of the range of drugs and dietary supplements, more than 79% of pharmacists who participated in the survey reported that their pharmacies have drugs and dietary supplements for weight loss and weight control. Among the most popular drugs for weight loss, which pharmacists most often mentioned, were orlistat and liraglutide. Orlistat was mentioned by 79.4% of respondents, and liraglutide - 63.1%. Among the most popular dietary supplements, phytoteas became the absolute leader - they were mentioned by 91% of respondents, "Ideal" capsules were also often mentioned - 76.2%, dietary supplements containing garcinia extract - 32.4% and dietary supplements containing Hoodia Hordonii - 67%.

Regarding the block of questions for collecting statistical indicators of demand and questions on advising customers on drugs and dietary supplements for weight loss, half of the pharmacists indicated that on average once or twice a week they dispense drugs or dietary supplements for weight loss and also provide advice on weight management. This indicates an active role of pharmacists in providing advice and support to patients who want to lose weight.

The pharmacists surveyed were interested in the feasibility of implementing additional services to help patients with obesity, and 87.2% indicated that they

consider it advisable to implement additional services to help patients with NMT and obesity. Among the proposed services that pharmacists could provide in pharmacies, 92% of respondents indicated that they could provide individual consultations on nutrition and physical activity, and BMI and waist and hip circumference could be determined by 72.4% of respondents. Almost 90% of respondents indicated that they are ready to support customers' interest in a healthy lifestyle by distributing informational brochures, conducting incentive events, and developing strategies for high-quality counseling and obesity detection together with medical professionals. Also, 97.7% of pharmacists who were involved in the survey indicated that they are ready to participate in dietetic training programs to increase their knowledge in this area.

Therefore, based on the responses received, it can be concluded that introducing weight management services in pharmacies is appropriate, as most pharmacists have medium to high knowledge of healthy eating and obesity prevention. They also expressed interest in expanding their knowledge of services, including individual counseling and weight measurement.

3.3. Practical approaches to improving pharmaceutical counseling for obese menopausal women.

In recent years, the problem of obesity has become increasingly relevant in society. Many people are looking for effective ways to lose weight and improve their health, which is why pharmacies, as the most accessible components of healthcare facilities, most often become the first, and often the last medical institutions to which patients turn. Because of this, pharmacists play an important role in providing consultations and initial diagnosis of diseases.

In providing weight management consultations in a pharmacy, the pharmacist works directly with other members of the multidisciplinary team, which may include dietitians, physiotherapists, psychologists, etc. This team works together to provide integrated and comprehensive support to clients to achieve their weight loss and healthy lifestyle goals. Pharmaceutical workers can provide advice on the range and

composition of dietary supplements that can help with weight management, taking into account the individual characteristics of the client. In their actions, the pharmacist can use their knowledge of pharmacodynamics and pharmacokinetics, taking into account possible interactions with drugs that the patient is taking.

The goal of the program is to develop a structured approach for pharmacists in a pharmacy setting to qualitatively assess risk factors, primary diagnosis of the disease, competent counseling, and create additional services for patients to qualitatively assess the presence of excess weight or determine the degree of obesity in a pharmacy setting.

One of the main aspects of the program is to establish interaction between specialists in the field of obesity. Since obesity is a complex problem that requires an integrated approach, cooperation between different specialists becomes extremely important.

A team of specialists may include doctors, dietitians, psychologists, pharmacists, physiotherapists and other health professionals with different specializations. The interaction of these specialists allows for a comprehensive and individual approach to weight management, and also promotes the exchange of knowledge and experience between specialists. This improves the effectiveness of treatment and helps patients achieve long-term success in losing weight and maintaining health.

Nutritionists and psychologists can develop information booklets for pharmacists to increase pharmacists' knowledge and disseminate such information to the public. Such booklets can include recommendations from nutritionists on the appropriateness of recommending certain diets to pharmacy customers, calculating daily calorie intake, and methods for determining the presence of NMD or obesity. Psychologists can recommend behavioral therapy methods to pharmacists and ways to encourage patients to adopt a healthy lifestyle.

The next thesis of this program is high-quality counseling of patients on issues related to obesity, a healthy lifestyle and methods of weight correction, which allows

pharmacists to determine the characteristics and needs of each client individually. To conduct a high-quality analysis of the patient's condition, the pharmacist must first ask questions about lifestyle, diet, calorie intake, consumption of certain foods, level of physical activity, medical history and other factors that may affect the development of obesity. After discussing such questions, the pharmacist can draw a conclusion about the patient's general condition

The next step after analyzing the patient's condition, based on the patient's answers, the pharmacist can offer the patient to determine the BMI and measure the waist and hip circumference. For such measurements, pharmacies would be advisable to allocate a separate area equipped with a screen, scales, a height meter and a centimeter. In order to improve such services and better understand the patient's condition, it would be advisable to create forms in which the patient or the pharmacist could mark the progress in the process of losing weight. Such forms can contain the patient's initial measurements, and empty columns for further monitoring of weight, that is, the patient can come to the pharmacy once or twice a month and measure his results. Such a step can perform the function of behavioral therapy, because the patient will see his results, and they will motivate him to continue actions aimed at losing weight.

After completing all the above steps, the pharmacist, relying on the advice of other specialists and his own knowledge of the problem of obesity, can recommend a dietary supplement for weight correction and a more effective weight loss process.

INTERDISCIPLINARY TEAM OF SPECIALISTS IN THE FIGHT AGAINST OBESITY

- Establishment of professional societies to share experienceDevelopment of information materials
- For further distribution among the population
- Recommendations on nutrition and diets
- Methods of increasing physical activity
- Ways to control weight on your own

- ❖ Booklets and memos for pharmacists to improve their competence
- ❖ On the primary diagnosis of the disease
- ❖ Methods of behavioural therapy
- ❖ Determining when it is appropriate to recommend dietary supplements
- ❖ Pharmacist counselling the population on issues of:
- ❖ Healthy lifestyle
- ❖ Proper nutrition
- ❖ Physical activity
- ❖ Taking dietary supplements and medicines prescribed by a doctor
- ❖ Distribution of information materials developed jointly with other specialistsIdentification of risks and diagnosis of existing obesity problems in a pharmacy
- ❖ Calculation of BMI
- ❖ Determination of waist and hip circumference
- ❖ Providing tools for tracking weight loss results

Thus, based on the responses received, it can be concluded that the introduction of weight management services in pharmacies is feasible, as most pharmacists have a medium to high level of knowledge about healthy eating and obesity prevention. They also expressed interest in expanding their knowledge of services, including individual counseling and weight measurement. When providing weight management consultations in a pharmacy, a pharmacist works directly with other members of a multidisciplinary team, which may include nutritionists, physiotherapists, psychologists, etc.

3.4. Conclusions to chapter №3

1. Having analyzed the world experience of preventive measures aimed at combating obesity, we concluded that this topic is very relevant in modern society. That is why we decided to conduct a survey of pharmacists regarding their awareness of this problem.

2. The survey was conducted during April 2025 among pharmacists of various pharmacies in Odessa and consisted of 5 questions related to the socio-demographic characteristics of the respondents and 18 questions regarding: General competence of pharmacists on the treatment, prevention and causes of obesity; statistical indicators of demand and questions regarding consulting customers on drugs and dietary supplements for weight loss; and questions regarding the feasibility of implementing additional services to help obese patients.

3. After receiving the survey results and processing them, it was concluded that the surveyed pharmacists have sufficient knowledge to provide quality counseling to obese patients. That is why, to improve public awareness and combat obesity, we proposed the “pharmaceutical community against obesity” program, the main task of which is to establish interaction between medical specialists in order to develop a quality model of prevention and treatment of obesity in the pharmacy and facilitate the process of losing weight for overweight patients.

CONCLUSIONS

1. In this qualification work for obtaining the Master's degree in specialty 226 "Pharmacy, Industrial Pharmacy", a large volume of scientific literature on the topic of obesity was analyzed and structured, the pharmaceutical market of dietary supplements was analyzed, and summary tables were compiled on their component composition, an analysis of world experience in combating obesity with the involvement of pharmacists was conducted, and an own program "pharmaceutical community against obesity" was developed, with the aim of a structured approach by pharmacists in a pharmacy to a qualitative assessment of risk factors, primary diagnosis of the disease, competent counseling, and the creation of additional services for patients for a qualitative assessment of the presence of excess weight or determination of the degree of obesity in a pharmacy.

2. During the analysis of scientific literature on the topic, it was noted that the problem of obesity is very relevant in the modern world, because according to WHO, more than 2 billion people in the world have weight problems, of which more

than 680 million suffer from obesity. The information that was processed determines the classification and methods of diagnosing obesity, the etiology and pathogenesis of the disease, methods of treatment and definition of metabolic syndrome in obesity.

3. The methods used by governments of various countries to regulate the problem of obesity, including in Ukraine, were analyzed. It was noted that the Order of the Ministry of Health of Ukraine dated March 3, 2023 No. 427 approved the clinical guideline and "Standards of medical care for obesity in adults", this guideline considers the basic principles of medical care, pharmacotherapy and methods of prevention and measures to reduce the harm from obesity.

4. The level of provision of the pharmaceutical market of Ukraine with drugs for the treatment of obesity was determined, namely, it was found that currently 3 dosage forms with the active ingredient liraglutide are registered in the State Register of Medicines of Ukraine, and 2 trade names are registered for the active ingredient orlistat. The indications for the use of drugs for the treatment of obesity, mechanisms of action, adverse reactions and contraindications were characterized.

5. The laws and guidelines regulating the circulation of dietary supplements in Ukraine were reviewed, and the substances used by manufacturers to produce dietary supplements were analyzed. Having analyzed the component composition of dietary supplements available in pharmacies in Odesa, we noted that among the means for detox therapy, LRS was most often used - 98 times (68%), vegetable fiber was found 17 times, which is 12%, extracts were used 20 times (14%), and substances of various origins 8 times (6%). And among the means that promote fat burning, extracts were most often used - 28 times (31%), LRS were used 18 times (20%), vitamins were also found 18 times (20%), trace elements - 10 times (12%), amino acids - 9 (10%), and substances of various origins 8 times (7%).

6. Having considered the world experience of involving pharmaceutical workers in the fight against obesity, in order to develop a program aimed at

improving knowledge about obesity in Ukraine, we conducted a survey on pharmacists' awareness of this problem. The questionnaire included 18 questions on the general competence of pharmacists in the treatment, prevention and causes of obesity, statistical indicators of demand and questions on consulting buyers about drugs and dietary supplements for weight loss, questions on the feasibility of introducing additional services to help obese patients.

7. After conducting a survey and analyzing the results, we determined that introducing a practice into the provision of weight management services in the pharmacy was appropriate, as most pharmacists had moderate to high knowledge of healthy eating and obesity prevention. They also expressed interest in expanding their knowledge of services, including individual counseling and weight-related measurements.

8. In order to implement the “Pharmaceutical Community Against Obesity” program in Ukraine, we developed a method of an integrated approach of various specialists with the involvement of pharmacists in a pharmacy for a qualitative assessment of risk factors, primary diagnosis of the disease, competent counseling, and the creation of additional services for patients for a qualitative assessment of the presence of excess weight or determination of the degree of obesity in a pharmacy.

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