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Complex correction of eating behaviour disorders, anthropometric and physiological indicators in patients with non-alcoholic fatty liver disease on the background of abdominal obesity

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Abstract

Purpose: to evaluate the effectiveness of correction of eating behaviour disorders, anthropometric, physiological indicators by implementing combined non-drug treatment for patients with non-alcoholic fatty liver disease on the background of abdominal obesity.

Material and methods

85 patients with non-alcoholic fatty liver disease on the background of abdominal obesity of the 1st degree were examined. All patients were divided into two clinical groups: 1st group (research) - 48 people, with average body mass index BMI=32.55±1.07 kg/m^2, who underwent a course of cognitive behavioural therapy, diet therapy, and physical activity for 6 months; the control group - 37 people with average BMI=31.95±1.03 kg/m^2 followed only a rational diet and physical activity, without cognitive behavioural therapy. The examination of the patients included the measurement of anthropometric and physiological indicators, questionnaires according to the DEBQ (Dutch Eating Behaviour Questionnaire).

Results

On the 180th day, the number of patients with normal blood pressure in the 1st group increased in 2.38 times (D=2.3511, p=0.0015), healthy eating behavior was recorded in 2.38 times more often (D=0.2215, p=0.0047) and the number of restrictive type of EB decreased in 2.0 times (D=0.4321, p=0.0031), compared to the control group.

Conclusion

A combined course of therapy in the form of a rational diet, aerobic exercise and cognitive behavioural therapy should be an integral component of early non-drug treatment, as a guarantee not only of the correction of anthropometric and functional indicators, but also of the modification of the eating behavior and a guarantee of long-term maintenance of the desired weight.

Key words: obesity, cognitive-behavioural therapy, eating behaviour, non-alcoholic fatty liver disease
Keywords: experience, innovations, realization, development, functioning

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Анотація

Людмила Кіро, Максим Зак, Інеса Кушніренко, Олег Чернишов. Особливості корекції розладів харчової поведінки, антропометричних та фізіологічних показників у пацієнтів з неалкогольною жировою хворобою печінки на фоні абдомінального ожиріння

Мета: оцінити ефективність корекції розладів харчової поведінки, антропометричних, фізіологічних показників шляхом впровадження комбінованого немедикаментозного лікування для пацієнтів з неалкогольною жировою хворобою печінки на фоні абдомінального ожиріння.

Матеріали та методи

Було обстежено 85 пацієнтів з неалкогольною жировою хворобою печінки на фоні абдомінального ожиріння 1 ступеня. Усіх пацієнтів розділили на дві клінічні групи: 1 група (дослідницька) – 48 осіб, з середнім індексом маси тіла $ІМТ_{ср.}$=32,55±1,07 кг/м^2, які проходили курс когнітивно - поведінкової терапії, дієтотерапії, фізичної активності упродовж 6 місяців; контрольна група - 37 особи з $ІМТ_{ср.}$=31,95±1,03 кг/м^2 дотримувались лише раціонального харчування та фізичних навантажень, без когнітивно - поведінкової терапії. Обстеження хворих включало вимірювання антропометричних та фізіологічних показників, анкетування за опитувальником DEBQ (Dutch Eating Behavior Questionnaire).

Результати

На 180-й день, кількість пацієнтів з нормальним артеріальним тиском у 1-й групі збільшилась у 2,38 рази (D=2,3511, p=0,0015), здорова харчова поведінка фіксувалась у 2,38 рази частіше (D=0,2215, p=0,0047), а кількість розладів харчової поведінки за обмежувальним типом зменшилась у 2,0 рази (D=0,4321, p=0,0031), у порівнянні з контрольною групою.

Висновки

Комбінований курс терапії у вигляді раціонального харчування, аеробних фізичних навантажень та когнітивно - поведінкової терапії, повинен бути невід'ємною складовою раннього немедикаментозного лікування, як запорука не лише корекції антропометирчних та функційних показників, але й модифікації типу харчової поведінки та гарантією довготривалого утримання бажаної ваги.

Ключові слова: ожиріння, когнітивно-поведінкова терапія, харчова поведінка, неалкогольна жирова хвороба печінки

Аннотация

Людмила Киро, Максим Зак, Инеса Кушниренко, Олег Чернышов. Особенности коррекции расстройств пищевого поведения, антропометрических и физиологических показателей у пациентов с неалкогольной болезнью печени на фоне абдоминального ожирения

Цель: оценить эффективность коррекции расстройств пищевого поведения, антропометрических, физиологических показателей путем внедрения комбинированного немедикаментозного лечения для пациентов с неалкогольной жировой болезнью печени на фоне абдоминального ожирения.

Материалы и методы

Обследовано 85 пациентов с неалкогольной жировой болезнью печени на фоне абдоминального ожирения 1 степени. Всех пациентов разделили на две клинические группы: 1 группа (исследовательская) - 48 человек, со средним индексом массы тела $ИМТ_{ср.}$= 32,55±1,07 кг/м^2, которые проходили курс когнитивно – поведенческой терапии, диетотерапии, физической активности в течение 6 месяцев; контрольная группа - 37 человек с $ИМТ_{ср.}$=31,95±1,03 кг/м^2 придерживались только рационального питания и физических нагрузок, без когнитивно-поведенческой терапии. Обследование больных включало измерение антропометрических и физиологических показателей, анкетирование по опроснику DEBQ (Dutch Eating Behavior Questionnaire).

Результаты

На 180-й день количество пациентов с нормальным артериальным давлением в 1-й группе увеличилось в 2,38 раза (D=2,3511, p=0,0015), здоровое пищевое поведение фиксировалось в 2,38 раза чаще (D=0,2215, p= 0,0047), а количество расстройств пищевого поведения по ограничительному типу уменьшилось в 2,0 раза (D=0,4321, p=0,0031) по сравнению с контрольной группой.

Выводы

Комбинированный курс терапии в виде рационального питания, аэробных физических нагрузок и когнитивно-поведенческой терапии должен быть неотъемлемой составляющей раннего немедикаментозного лечения, как залог не только коррекции антропометирических и функциональных показателей, но и модификации типа пищевого поведения и гарантией длительного удержания желаемого веса.

Ключевые слова: ожирение, когнитивно-поведенческая терапия, пищевое поведение, неалкогольная жировая болезнь печени

Introduction

In our days, obesity is recognized as a new non-infectious epidemic. Statistics show that more than 30% of the planet's inhabitants are overweight, of which 16.8% are women and 14.9% are men, and by 2025, approximately half of women and more than 40% of men are predicted to suffer from obesity [1,2]. Therefore, one of the main problems of society and health - the problem of fighting excess weight - must be understood and solved today. An overweight person becomes socially vulnerable, even if at first glance he seems quite self-confident and successful. Subconsciously, most of us compare ourselves to others and want to be attractive, interesting and, above all, healthy. Some still manage to cope with complexes, communicate normally and lead an active lifestyle. But even such morally strong people are actually limited in movement, have a number of diseases that progress with each additional kilogram. It is difficult for the body to cope with excess fat, organs and systems suffer. Among the most common complications of obesity, it is necessary to note: cardiovascular diseases (stroke, heart attack, hypertension, atherosclerosis); non-psychotic mental disorders, diseases of the respiratory system; disorders of the endocrine system (diabetes, hormonal failures in the work of the gonads); diseases of the digestive organs (gallstone disease, cholecystitis); deterioration of the musculoskeletal system (impaired blood circulation, weakened muscles, arthritis, osteoporosis); oncology [3-6]. Menstrual cycle is disturbed due to obesity in women, erectile function in men [7]. According to randomized studies, the percentage of risk of developing non-alcoholic fatty liver disease (NAFLD) increases proportionally with increasing weight [8], taking this into account, the study is devoted to the development, implementation and evaluation of an effective system of physical exercises and cognitive-behavioral training for patients with the above-mentioned comorbid pathology.

One of the main causes of obesity and NAFLD is eating disorders (ED), which cause about 7000 deaths per year (as of 2020), making them the mental diseases with the highest mortality [9-11] . In developed countries, about 1.6% of women and 0.8% of men suffer from psychogenic overeating, depending on the year. Over the last decade, the number of hospitalizations related to RCP has increased among all age groups [12] . The greatest growth occurred among people aged 45-65 (88%), after hospitalizations among people under 12 years of age (72% increase). Total costs in the US for hospital stays due to or including eating disorders increased from $165 million in 1999/2000 to $277 million. in 2010-2020; it is 68% more [13-15] . The average cost of living for a person with an eating disorder has increased by 29% over the decade, from $7,300 to $9,400 [16-19].

The modern health care system faces two main tasks: the first is the effective development of programs aimed at optimizing the body mass index; the second is the development of methods for long-term maintenance of the desired weight. The data of many randomized studies [20] indicate that adherence to a rational diet and exercise alone is insufficient for long-term weight maintenance and correction of non-psychotic mental disorders, which are very often a component of obesity, so a combined method of treatment is an alternative for obese patients.

Purpose: to evaluate the effectiveness of correction of eating behaviour disorders (EB), anthropometric, physiological indicators by implementing individual physical exercises and cognitive-behavioural training for patients with NAFLD on the background of abdominal obesity.

Material and Methods

Participants

85 patients (42 women, 43 men) were examined on the basis of the University Clinic of the Institute of Medicine of Petro Mohyla Black Sea National University and the Polyclinic of the State University "Territorial Medical Association of the Ministry of Internal Affairs of Ukraine in the Mykolaiv Region". The age of women varied from 18 to 60 years (average age 41.5±11.2 years), the age of men - from 21 to 60 years (average age - 40.5±12.3 years). All patients were divided into two clinical groups: group 1 (research group) - 48 people (24 women and 24 men), patients with NAFLD and obesity of the 1st degree with BMI from 31.0 kg/m^2 to 34.1 kg/m^2 with average BMI=32.55±1.07 kg/m^2 , who underwent a course

of CBT, diet therapy, and physical activity for 6 months; the control group - 37 people of NAFLD (19 women and 18 men) with abdominal obesity of the 1st degree (BMI from 30.0 kg/m ^{2} to 33.9 kg/m ^{2} ; average BMI=31.95±1.03 kg/m^2), patients who followed only diet therapy, recommended physical activity, without involvement in cognitive-behavioral training (information about obesity was obtained from brochures and mass media).

Procedure

The general clinical examination of patients consisted of measuring anthropometric and physiological indicators.

The anthropometric study included: determination of body height and weight, calculation of the body mass index (kg/m^2), measurement of the circumference of the waist and hips, the index "waist circumference/hip circumference" (WC/HC); physiological: measurement of blood pressure (presence of arterial hypertension), heart rate, .

Patients who met the following criteria were included in the experiment: exclusion of alcohol consumption ≥30 g/day in the case of a man and ≥20 g/day in the case of a woman; individual and family anamnesis of diabetes, hypertension and cardiovascular diseases were analyzed in detail, BMI, waist circumference, changes in body weight were calculated; laboratory-confirmed negative results for markers of HBV and HCV infection; excluding the use of steatogenic drugs; slight or moderate increase in the activity of ALT and AST (AST/ALT <1) and GGT (≈50% of cases, ultrasound data (increased echogenicity (steatosis) of the liver, rarely hepatomegaly; in cirrhosis, symptoms of portal hypertension). Considering technical difficulties in the presence of obesity, mainly due to the impossibility of visualizing minor steatosis (<20% of liver mass), the inability of ultrasound to differentiate simple steatosis of NASP from NASH), MRI is recommended for patients with abdominal obesity, which evaluates minor steatosis (5-10% of hepatocytes). Theoretically, 1H-MRS is the only proven method for quantifying liver fat content. Extended diagnostics based on the initial assessment of probability or research results included: determination of ferritin concentration, saturation of transferrin with iron; tests to detect celiac disease, thyroid disease and polycystic ovary syndrome; research to identify rare liver diseases - Wilson-Konovalov disease, autoimmune diseases, α1-antitrypsin deficiency.

To interpret the type of EB, the DEBQ (Dutch Eating Behavior Questionnaire) adapted to the purpose of the study was used. Patients were offered answers to 33 questions , each of which has 5 answer options: "never", "rarely", "sometimes", "often" and "very often", which are subsequently rated on a scale from 1 to 5, except for 31-th item, which has inverse values. To calculate the points in the questionnaire on each scale, the values of the answers to each item were added up and the received sum was divided by the number of questions on this scale. ***Questions 1-10*** represent a scale of restrictive eating behavior, which is characterized by deliberate efforts aimed at achieving or maintaining a desired weight through self-restriction in food. **Questions 11-23** - the scale of emotional eating behavior, in which the desire to eat arises in response to negative emotional states. ***Questions 24-33*** - the scale of external eating behavior, in which the desire to eat is not stimulated by a real feeling of hunger, but by the appearance of food, its smell, texture, or the appearance of other people who take food. The average indicators of restrictive, emotional and external eating behavior for people with a normal weight are 2.4, 1.8 and 2.7 points, respectively. If any of the scales score more than the average value, then it is possible to diagnose a disorder in eating behavior.

Patients of all clinical groups followed the recommendations for a healthy diet and physical activity. Diet included: reducing the daily calorie content of food, in which the daily calorie content of food for women is 1200-1400 kcal, and for men - 1400-1600 kcal; the amount of fats used with food did not exceed 29% of the daily caloric intake of food, 30-50% of consumed fats consisted of polyunsaturated fatty acids, the source of animal fats was lean fish, poultry (without skin), lean beef tenderloin was occasionally allowed; the share of carbohydrates accounted for 50-60% of the number of kilocalories consumed daily, to enrich food with calcium in the diet it was recommended to introduce milk or kefir 0.5%, table salt was limited to 4.5 g per day. In the presence of violations of carbohydrate metabolism, it was also recommended to count bread units (HO), with

obesity of the 1st degree (BMI=35-40 kg/m ^{2}), the daily norm is -10 HO.

Physical education were conducted in the form of macrocycles, which were divided into two periods: introductory, or preparatory, and main. In the introductory (preparatory) period, the main task is to overcome reduced adaptation to physical exertion, to restore motor skills and physical capacity that lag behind age norms, to achieve the desire to actively and systematically engage in physical education. For this purpose, the following forms of exercise therapy were used: therapeutic gymnastics (with the inclusion of large muscle groups), dosed walking in combination with breathing exercises, self-massage. The main period is intended for solving all other treatment and recovery tasks. In addition to therapeutic gymnastics, patients are recommended dosed walking and running, walks, sports games, active use of simulators. In the following, physical exercises are aimed at supporting the achieved rehabilitation results; running, rowing, swimming, cycling, and skiing in winter are used. One of the important factors in the prevention and treatment of obesity is proper breathing: in order for fats to release the energy invested in them, they must be oxidized.

Classes for patients should be long (45-60 min.), movements were performed with a large amplitude, due to which large muscle groups are included in the work, swings, circular movements in large joints, exercises for the body (tilts, turns, rotations) are used. exercises with objects.

The physical activity program followed by the patients

Before breakfast, they performed morning hygienic gymnastics for 20-25 minutes. followed by a water treatment (shower, bath). An alternative to morning gymnastics was a walk lasting from 30 minutes. up to 1-1.5 hours (depending on the condition of the patient and the topography of the area).

Between breakfast and lunch, time was filled with walks, hot tubs, therapeutic gymnastics, and swimming.

An hour of rest after lunch is usually replaced by a walk on flat terrain. In cases of relative weakness, rest in a chair, alternating with walking, was indicated. In addition to walks or terrenkur during the day or in the evening, air baths, swimming, sports and moving games are prescribed.

Cyclic exercises, in particular walking and running, should occupy a significant specific weight in the classes of overweight people. Dosed walking was recommended at an average pace: from 90 to 120 steps/min (from 4 to 5.6 km/h). Jogging, metered running. The running class was built in the following way: before the run, a warm-up was carried out (10-12 min.), then jogging "for 5-6 min." plus walking (2-3 min.); then rest (2-3 min.) - and so 2-3 times during the entire session. Gradually, the intensity of running increased, and the duration decreased to 1-2 minutes, the number of series increased to 5-6, and the pause between them increased. After 2-3 weeks (or more) of training, they switched to longer runs of moderate intensity up to 20-30 minutes. with 1-2 rest intervals.

Approximate schedule of classes for patients with obesity of the first degree with accompanying NAFLD, but with a satisfactory state of the cardiovascular system: 2 times a week - LH, 2 times dosed walking (DW), once dosed running (DR) and sports games (SG).

Swimming lessons consisted of 3 parts: introductory (10-15 min.) - lessons in the hall ("dry" swimming); main (30-35 min.) - swimming of moderate intensity in various ways with pauses for rest and breathing exercises (5-7 min.) and final (5-7 min.) - exercises near the side to restore blood circulation and breathing functions.

Training on simulators was recommended 2 times a week, alternating every 3-5 minutes of work and rest for 60-90 minutes. classes, had a positive effect on clinical indicators and most effectively influenced lipid metabolism. At the same time, heart rate control was carried out, the value of which should not exceed 65-75% of the individual maximum heart rate.

1 group (research) - 48 people (24 women and 24 men), patients with NAFLD and obesity of the 1st degree with an average BMI=32.55±1.07 kg/m ^{2}, took an active part in CBT. The total number of meetings with patients was 2 times a week, the duration of one coaching session was 30 minutes, a total of 48 sessions. The components of CBT were: motivational interview; the stage of actual cognitive-behavioral training (psychoeducation); the final stage - consolidation of acquired attitudes and prevention of relapses.

The main methods of CBT that were used during coaching trainings: cognitive psychotherapy, reciprocal inhibition, rational-emotive psychotherapy, self-control, the Stop-Faucet technique and anxiety control, relaxation, self-instruction, self-observation, research and analysis of threatening consequences, the method of finding advantages and shortcomings, a paradoxical intention.

Among the main directions of CBT, three components were identified:

- Cognitive therapy. The doctor helped the patient to form a positive attitude towards himself, rational-emotional therapy. A person must give up unattainable goals and unfulfilled desires.

- Multimodal therapy. With the help of a specialist, the patient analyzes the situation from all sides, describes the thoughts and feelings that arise in him, tried to understand them, looked for a way out and ways to solve the problem.
- Behavioral therapy. It includes self-observation, self-instructions, self-control, relaxation and other actions to regulate one's behavior.

Patients of the 2nd group of CBT did not receive cognitive-behavioral training before the start of treatment; information about the negative impact of obesity was obtained only from mass media.

The effectiveness of CBT was carried out by comparing intergroup indicators: initial and final anthropometric and physiological indicators of the patient, analysis of changes in the type of CP (on the 1st day, 90th day, 181st day); analysis of changes in the type of CP.

The study was conducted in accordance with the basic bioethical norms of the Helsinki Declaration of the World Medical Association "Ethical Principles of Medical Research Involving Humans as Research Subjects" (1964), with changes and additions to the General Declaration on Bioethics and Human Rights. United Nations (2005), Council of Europe Convention on Human Rights and Biomedicine (1997). All participants were informed about the goals, organization, methods of the study and signed an informed consent to participate in it. All measures are also taken to ensure patient anonymity.

Statistics analysis

Statistical processing of the research results was carried out by the methods of variational statistics using the standard SPSS 13.0 program package for MS Windows. The Kolmogorov-Smirnov test was used to establish differences between samples. A difference was considered significant if the achieved significance level (p-value) was lower than 0.05. The Kruskel-Wallis test was used to establish correlation between samples. Correlation between samples was considered to be present at p-value <0.05.

Results

Patients who received CBT managed to improve their anthropometric indicators . A correlation between the amount of lost weight and the type of therapy was recorded in patients of the control and 1st groups, in particular, a decrease in body weight from 6 to 11 kg in patients of the 1st group was recorded 2.2 times more often (x^2 =5.1003, p-value=0.0286), than among individuals of the control group; and weight loss in the range from 18 to 23 kg was recorded 3.62 times more often (x^2 =12.7929, p-value=0.0004) than in patients of the control group without CBT (Table 1).

Table 1

Relationship between weight loss and type of treatment in clinical groups

Amount of weight lost after 6 months of therapy (kg)	1 group (research), BMI = 32.55 ±1.07 kg/m^2, (n=48)			Control group, BMI = 31.95 ±1.03 kg/m^2, (n=37)				
	M±SEM	n	%	M±SEM	n	%	x^2	p-value
0-5	4.0 ± 1.0	3	6.7	3.67 ± 0.82	6	16.7	2,1921	0.1687
6-11	7.2 ± 1.64	5	11.1	9.00 ± 1.48	11	28.9	5.1003	0.0286 *
12-17	14.2 ± 2.28	5	11.1	15.22 ± 1.72	9	26.7	2.9375	0.1388
18-23	19.41 ± 1.24	29	57.8	20.88 ± 2.17	8	23.3	12.7929	0.0004 *
24-29	26.75 ± 1.89	4	8.9	24.00 ± 0.00	2	3.3	0.2730	0.6927
>30	30.0 ± 0.0	2	4.4	30.00 ± 0.00	1	1.1	1.5573	1.0000

* There is a relationship between the amount of lost weight and the type of therapy (p-value< 0.05).

Correlation between the number of lost centimeters (cm) on the waist of patients and the type of therapy was also recorded in patients of the control and 1st groups, in particular, the frequency of reduction of waist volume indicators within 8-9 cm during 6 months of observation, in patients of the 1st group was recorded 1.5 times more often (x^2=7.6822, p-value= 0.0075) than among the control group (Table 2).

Table 2

Correlation between waist circumference (cm) and the type of therapy received by the patients in diferente clinical groups

Waist circumference (cm) decreased after 6 months of therapy	1st group (research), BMI = 32.55 ±1.07 kg/m^2, (n=48)			Control group, BMI = 31.95 ±1.03 kg/m^2, (n=37)				
	M±SEM	n	%	M±SEM	n	%	x ^{2}	p-value
0-1	0.55 ± 0.07	2	5.6	0.7 ± 0.21	5	16.7	2.4154	0.2312
2-3	2.53 ± 0.21	3	8.9	2.4 ± 0.42	8	21.1	4.3820	0.0511
4-5	4.62 ± 0.38	5	10.0	4.47 ± 0.29	9	22.2	2.9375	0.1388
6-7	6.50 ± 0.31	6	11.1	6.27 ± 0.25	3	8.9	0.4257	0.7253
8-9	8.43 ± 0.35	26	53.3	8.31 ± 0.29	9	22.2	7.6822	0.0075 *
>10	10.22 ± 0.15	6	11.1	10.13 ± 0.15	3	8.9	0.4257	0.7253

* There is a relationship between the amount of weight lost and the type of therapy (p-value < 0.05).

A correlation between the number of lost centimeters (cm) on the hips of patients and the type of therapy was recorded in patients of the control and 1st groups, in particular, a decrease in thigh volume indicators within 6-7 cm during 6 months of observation was recorded in 2, 36 times more often (x^2 =8.0768, p-value= 0.0078) among the 1st group of patients than among the control group; a decrease in thigh volume indicators of more than 10 cm in patients of the 1st group was also recorded 2.36 times more often (x^2 =4.8031 , p-value= 0.0371) than among the control group (Table 3).

Table 3

Correlation between hip circumference (cm) and the type of therapy received by the patients in diferente clinical groups

Hip circumference (cm) decreased after 6 months of therapy	1st group, BMI = 32.55 ±1.07 kg/m^2 (n=48)			Control group, BMI = 31.95 ±1.03 kg/m^2 (n=37)				
	M±SEM	n	%	M±SEM	n	%	x ^{2}	p-value
0-1	0.55 ± 0.07	2	4.5	0.75 ± 0.23	6	20.0	3.5581	0.0734
2-3	2.53 ± 0.21	3	5.5	2.42 ± 0.40	5	18.9	1.2929	0.2867
4-5	4.45 ± 0.64	2	4.4	4.00 ± 0.00	2	7.8	0.0715	1.0000
6-7	6.68 ± 0.30	33	67.8	6.49 ± 0.19	14	41.1	8.0768	0.0078
8-9	8.47 ± 0.48	6	13.3	8.63 ± 0.15	3	10.0	0.4257	0.7253
>10	10.35 ± 0.07	2	4.5	10.31 ± 0.34	7	2.2	4.8031	0.0371*

* There is a relationship between the amount of weight lost and the type of therapy (p-value < 0.05).

In patients of the 1st group, in contrast t o the control group, on the 180th day of therapy, a n increase in the number of patients with normal bl ood pressure by 3.17 times (D=0.2215, p=0.0047) and a decrease in patients with hypertension of the 1st degree by 1.8 times (D=2.3804 , p= 0.0499), co mpared to observation day. The number of patients with normal blood pressure on the 180th day in gro up 1 was 2.38 times higher than in the control grou p. (D=2.3511, p=0.0015) (Table 4). On the 180th d ay of the study, in patients of the 1st group, the nu mber of patients with healthy EB increased in 4.75 times (D=0.2215, p=0.0038), and the number of pa tients with restrictive EB decreased in 2.0 times (D =0.3215, p=0.0049), compared to the 1st day of ob servation. On the 180th day of therapy, in patients of the 1st group, healthy EB was recorded 2.38 tim es more often (D=0.2215, p=0.0047), and the num ber of EB disorders of the restrictive type decrease d in 2.0 times (D=0.4321, p=0.0031), in compariso n with the control group (Table 5).

Table 4

Indicators of blood pressure (BP) in clinical groups, depending on the type of corrective therapy

Indicators of blood pressure (mm Hg), M±SEM	1st group (research), BMI $_{averange}$= 32.55 ±1.07 kg/m ^{2}, (n=48)				Control group, BMI $_{average}$ =31.95±1.03 kg/m ^{2}, (n=37)				Difference between 1 st and Control groups			
	Indicators before CBT (1st day)	Indicators after 6 months of CBT (180th day)	The difference in blood pressure indicators before and after CBT in the 1st group		Indicators before CBT (1st day)	Indicators after 6 months (180th day)	The difference between initial and final BP values in the control group		The difference between the initial blood pressure indicators in the 1st and the Control group		The difference between the final blood pressure indicators in the 1st and the Control group	
	n (%)	n (%)	D	P	n (%)	n (%)	D	P	D	P	D	P
<120/80	2 (4.2 %)	8 (16.6 %)	0.2205	0.0909	3 (8.1%)	7(18.9 %)	0.3830	0.3081	0.4969	0.6488	0.8587	0.7832
121-139/81-89	6 (12.5 %)	19 (39.6 %)	0.2215	0.0047 *	5(13.5 %)	8(21.6 %)	0.5707	0.5426	0.9153	1.0000	2.3511	0.0015
140-159/90-99	20 (41.7 %)	11 (22.9 %)	2.3804	0.0499	13(35.1%)	10(27 %)	1.4549	0.6160	1.3144	0.6546	0.8048	0.8006
160-179/100-109	12 (25%)	6 (12.5 %)	2.3129	0.1902	10(27 %)	8(21.6 %)	1.3372	0.7870	0.9011	1.0000	0.5219	0.3772
>180/110	8 (16.6 %)	4 (8.4 %)	2.1827	0.3553	6(16.3 %)	4(10.9 %)	1.5867	0.7355	1.0329	1.0000	0.7525	0.7235

* There are differences in the frequency of blood pressure indicators (p-value< 0.05)

Table 5

The structure of different types of eating behaviour, depending on the type of therapy

Types of eating behavior (EB)	1st group (research), BMI$_{averange}$= 32.55 ±1.07 kg/m^2, (n=48)				Control group, BMI $_{average}$ =31.95±1.03 kg/m^2, (n=37)				Difference between 1st and Control groups			
	Type of EB before therapy	Type of EB after therapy	The difference in EB in the 1st group		Type of EB before therapy	Type of EB after 6 months	The difference between initial and final types of EB in the control group		The difference between the initial indicators of EB in the 1st and the control group		The difference between the final types of EB in the 1st and the control group	
	n (%)	n (%)	D	P	n (%)	n (%)	D	P	D	P	D	P
Healthy type of EB	4 (9.8%)	1 9 (39.5 %)	0.221	0.003	4 (14.4 %)	8 (21.6 %)	3.092	0.0101	1.009	0.061	0.221	0.004

Restrictive type of EB	21 (42.4 %)	11 (22.9 %)	0.32 1	0.004	1 5 (40.0 %)	13 (35.2 %)	3.98 7	1.743 2	2.34 2	1.325	0.432	0.003
Emotionog enic type of EB	5 (10.8 %)	3 (6.3%)	2.49 9	1.012	5 (10.0 %)	5 (13.5 %)	1.09 8	1.432	2.23 1	1.010	2.312	1.253
Exogenous type of EB	18 (37.0 %)	15 (31.3 %)	3.42 1	1.021 3	13 (35.6 %)	11 (29.7 %)	1.00 9	1.986	2.09 6	1.023	3.112	1.087

* There are differences in the frequency of blood pressure indicators (p-value < 0.05)

Discussion

Based on the results of the study, it is possible to state a fairly high effectiveness of combined treatment (combination of diet therapy, aerobic and anaerobic physical exercises, cognitive-behavioural therapy) for the treatment of people with NAFLD against the background of abdominal obesity of the first degree. Anthropometric and functional indicators in patients of the 1st group who underwent a course of complex treatment were significantly better than in the control group. This is due to the fact that adequate aerobic and anaerobic exercise contributes to: increasing energy expenditure, reducing excess body weight and strengthening muscles, restoring and maintaining physical and professional performance. Thanks to the application of physical endurance exercises, gymnastic exercises for medium and large muscle groups alternating with respiratory ones, it was possible to increase energy consumption and oxygen absorption, promote the consumption of a large amount of carbohydrates, as well as the release of fats from the depot and their breakdown. Our study agrees with the data of randomized studies, that for a more sustainable effect, it is necessary to include a variety of general developmental exercises, walking, running, walks, terrenkur, short-distance tourism, swimming, rowing, cycling, skiing , moving and sports games [21-23]. A significant place should be given to exercises to strengthen the muscles of the trunk and abdomen, corrective and breathing exercises. Physical therapy is contraindicated in case of exacerbation of concomitant diseases. Aerotherapy (air baths, oxygen cocktails) is also recommended for all obese patients. Mechanotherapy is used in the form of exercises on simulators to increase energy expenditure and reduce body weight, general strengthening and improvement of physical capacity and special training of the body. Exercise bikes, treadmills, rowing machines and other exercise machines are used. It is advisable to recommend occupational therapy to increase and maintain physical capacity, strengthen muscles and joint mobility, increase energy expenditure and prevent weight gain. Therapeutic massage is prescribed to improve the general tone of the body; activation of peripheral blood and lymph circulation, oxidation-reduction and exchange processes; counteracting disorders of the motor-evacuatory function of the intestine; eliminating fatigue and increasing muscle tone and performance [24, 25]. General massage, underwater shower-massage, self-massage are used.

To obtain stable results during physical exercises, it is recommended to follow several principles:

- The principle of gradualness means the need to gradually increase loads. Neglecting this principle can lead to injury and loss of interest in classes.
- The principle of systematicity means the need for regular training. In case of cessation or significant reduction of loads, the results that were achieved are quickly lost. This principle gave rise to the famous saying: "Use it or lose it."
- The principle of individuality means that each person has unique characteristics that determine his ability to adapt to physical exertion.

The relevance and novelty of the research lies in the fact that for the first time at our department, a comparison and analysis of the effectiveness of physical activity with CBT was made, the impact of complex treatment was considered not only on anthropometric and functional indicators, but also on the correction of the patient's EB.

People who are prone to obesity need to maintain a healthy lifestyle and periodically undergo cognitive-behavioral training if they do not want to return to their previous state, because it is known that many people who suffer from obesity, after achieving a positive result, return to their usual diet again , stop playing sports and as a result return to what they started with.

CBT recommendations that patients should follow during cognitive-behavioral training for long-term maintenance of the desired body weight:

- Awareness of the fact that there is a problem (relatives, medical workers, mass media, a personal critical approach can help with this);

- ❖ Motivation (to answer the question: why should I lose weight?);
- ❖ The specific goal is to reduce weight (to answer the question: how much and for what period do I want to lose weight?). It is important that the goal is rational (according to WHO recommendations: from 0.5-1 kg/week, reducing energy consumption by 500 kcal/day);
- ❖ Self-monitoring (each of the patients carefully entered a food diary and wrote down activities, weighing, recording situations in which they eat, a list of products consumed during the day);
- ❖ Managing or changing stimuli that trigger eating (TV, shopping for food);
- ❖ Eating style (slowing down the eating process, enjoying the flavors of food, drinking water);
- ❖ Motivational reward for following the rules (money, desired purchases, trips);
- ❖ Meal planning (in advance);
- ❖ Control of physical activity;
- ❖ Social support (support of loved ones, change of diet and food traditions in the family);
- ❖ Cognitive restructuring (a person eats a piece of pie, choosing further physical activity instead of blaming himself);
- ❖ Take the time to plan your diet (how to eat at a party, feast).

Correction of EB and long-term weight maintenance is achieved precisely by cognitive-behavioral training, which helps to motivate the patient, modify his eating habits, instill in him the skills of a healthy lifestyle, and encourage him to maintain the desired weight even after the end of the course of treatment.

Conclusions

Obesity is a disease requiring complex therapy, which should include optimal physical activity, rational nutrition and, without fail, cognitive-behavioral training. CBT in the treatment of obesity is a whole arsenal of methods, including many techniques and methods aimed at: the formation of stereotypes of nutrition and behavior of a slender person; correction of overeating as a reaction to stress - a very common cause of obesity; getting rid of addiction to high-calorie foods, forming a calm, indifferent attitude towards them; forming the ability to understand the signals of your body and satisfy its true needs without "jamming" them. A combined course in the form of a balanced diet, aerobic exercise and cognitive-behaviorral therapy should be an integral component of early non-drug treatment, as a key to correcting anthropometric and functional indicators, modification of EB skills and a guarantee of long-term maintenance of the desired weight.

Conflict of interest

The authors declare that there is no conflict of interest.

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