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INFLUENCE OF PHYSICAL EXERCISE ON THE DYNAMICS OF SYMPTOMS IN PATIENTS WITH DEPRESSIVE EPISODES

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Abstract. The article examines the role of physical exercise as an important non-drug component of comprehensive therapy for patients with depressive episodes. Based on the analysis of modern scientific sources, in particular systematic reviews, meta-analyses and network meta-analyses of randomized controlled trials published mainly in the last five years, data on the epidemiological relationship between physical activity and the risk of depression, neurobiological mechanisms of the antidepressant effect of physical exercise (modulation of BDNF, monoaminergic systems, reduction of neuroinflammation), as well as the comparative effectiveness of different types of exercise (aerobic, strength, body-oriented practices) are summarized. In our own clinical observation of 30 patients with a depressive episode, it was found that the inclusion of a structured aerobic exercise program in standard drug therapy is accompanied by a statistically significant and clinically significant reduction in the severity of depressive symptoms on the HDRS-17 and BDI-II scales compared with the control group. The feasibility of including individualized physical exercise programs in the complex rehabilitation of patients with depressive disorders is substantiated. A promising direction for further research is the optimization of physical activity regimens depending on the clinical course of depressive episodes and the study of the long-term stability of the achieved effect.

Conclusions.

1. The inclusion of a structured aerobic physical exercise program in the complex treatment of depressive episodes provides a statistically significant reduction in depressive symptoms: the reduction in HDRS-17 scores in the main group was 34.5% more pronounced compared to the control group that received only drug therapy.

2. Aerobic exercises of moderate intensity lasting 45 minutes three times a week for eight weeks are a safe and effective non-drug method for correcting depressive states, which is consistent with the optimal dosage parameters established in modern meta-analyses.

3. Most patients with depressive episodes (76.7%) led a sedentary lifestyle before the start of treatment and did not adhere to the recommended level of physical activity, which indicates the need for targeted work to increase the motor activity of this category of patients.

4. Subjective improvement in general well-being, increased energy levels and decreased anxiety were noted by 73.3% of the participants of the main group after 3–4 weeks of regular classes, which emphasizes the fairly rapid therapeutic effect of physical exercises, probably associated with acute neurobiological changes (modulation of BDNF and monoaminergic neurotransmission).

5. Difficulties with motivation to perform physical exercises at the initial stages were noted by 20% of patients, which indicates the importance of psychological support and an individual approach when implementing physical activity programs in this group of patients.

6. The results obtained are consistent with the data of modern international systematic reviews and meta-analyses and confirm the feasibility of developing and widely implementing individualized physical activity programs as a mandatory component of comprehensive therapy for depressive episodes along with medication and psychotherapy.

Keywords: physical therapy, rehabilitation, depressive episodes, physical exercise, aerobic exercise, brain-derived neurotrophic factor, psychoemotional state, cognitive functions, quality of life, non-drug therapy of depressive episodes.

Introduction. Depressive episodes remain one of the most common forms of mental disorders of our time and constitute an important medical and social problem. According to the World Health Organization, at least 280 mil-

lion people in the world suffer from depressive disorders, and the disorder itself is one of the leading causes of the global burden of disease and disability of the population [7]. Current epidemiological data indicate a steady trend

towards an increase in the prevalence of depressive symptoms, which is partly associated with the consequences of the COVID-19 pandemic, chronic psycho-emotional stress, urbanization and a decrease in the level of daily physical activity of the population. In a recent general review, Marx W. et al. (2023), published in *Nature Reviews Disease Primers*, emphasized the heterogeneity of pathogenetic mechanisms of major depressive disorder, including disorders of monoaminergic neurotransmission, dysfunction of the hypothalamic-pituitary-adrenal axis, chronic neuroinflammation, and decreased neurotrophic support of the hippocampus [12].

Due to the high prevalence of depressive states and limitations of pharmacotherapy (delayed onset of action of antidepressants, side effects, insufficient adherence of patients to treatment, resistant forms), the search for effective non-drug methods for correcting depressive states remains relevant, among which physical activity occupies an important place. Modern studies of the last five years convincingly indicate the positive effect of regular physical activity on the psychoemotional state of patients with depressive disorders, and the effect is observed both at the level of primary prevention and within the framework of complex therapy of an already established depressive episode.

Despite the significant evidence base accumulated in recent years, the issues of optimal level of physical activity, duration of classes, choice of exercise modality (aerobic, strength, mixed, body-oriented practices) and individual selection of physical activity programs for patients with different degrees of severity of depressive episode require further scientific substantiation. This led to the aim of this work — to summarize current scientific data on the role of physical activity in the therapy and prevention of depressive episodes and to analyze our own observations of a group of patients who received a structured physical exercise program against the background of standard drug therapy.

Purpose of the research. To assess the impact of a structured aerobic physical activity program on the dynamics of depressive symptoms in patients with depressive episodes against the background of standard drug therapy.

To achieve the goal, the following tasks were defined: - to assess the baseline level of daily physical activity of patients with depressive episodes; - to compare the dynamics of the HDRS-17 and BDI-II scales in the main group (drug therapy in combination with a physical exercise program) and the control group (only drug therapy); - to analyze the subjective assessment of patients' changes in well-being, energy level and anxiety against the background of the physical exercise program; - to assess the safety and acceptability of the proposed physical activity program.

Materials and organization of research of the research. In order to study the impact of physical activity on the course of depressive episodes, we conducted an examination and observation of a group of patients with a previously established diagnosis of a depressive episode

of varying severity. The study involved 30 people aged 18 to 55 years who were receiving outpatient treatment from a psychiatrist at their place of residence and receiving standard antidepressant medication according to current clinical protocols. Inclusion criteria were: a verified diagnosis of a mild or moderate depressive episode, age from 18 to 55 years, no contraindications to physical activity, and written informed consent to participate in the study. Exclusion criteria were a severe depressive episode with psychotic symptoms, suicidal behavior at the time of inclusion, severe somatic pathology limiting physical activity, and substance abuse. Patients were divided into two groups by simple randomization: the main group (n=15), whose participants, in addition to drug treatment, performed a developed exercise program, and the control group (n=15), which received only standard pharmacotherapy without structured intervention regarding physical activity. The groups were comparable in age, gender, severity of depressive symptoms, and duration of the disease at the time of inclusion in the study.

To assess the baseline level of depressive symptoms and the dynamics of its changes, the Hamilton Depression Rating Scale (HDRS-17) and the Beck Depression Inventory (BDI-II) were used - validated, widely used in clinical practice tools for quantitative assessment of the severity of depression. To collect data on the level and nature of daily physical activity, an author's questionnaire was used, developed taking into account the structure and principles of the International Physical Activity Questionnaire (IPAQ) and adapted to the purpose of this study; The questionnaire included questions about the frequency, duration, and intensity of physical activity in various areas of daily life (domestic, transportation, leisure), as well as about subjective well-being, energy levels, and anxiety before and after the program.

The physical activity program for the main group included moderate-intensity aerobic exercise (paced walking, stationary cycling, light jogging, Nordic walking) for 45 minutes three times a week for eight weeks (two months), which corresponds to the optimal dosage parameters described in modern meta-analyses [2, 3].

The physical activity program for patients in the main group (n=15) was designed as a structured 8-week (2-month) program of moderate-intensity aerobic training, which was carried out as an addition to standard drug therapy. The sessions were held three times a week (Monday–Wednesday–Friday), with at least one day of rest between sessions, lasting 45 minutes each, under the direct supervision of a physical rehabilitation specialist.

The total number of sessions during the entire observation period was 24 (3 sessions × 8 weeks). The program was built on the principle of progressive overload, which is a standard approach in cardiac rehabilitation and psychiatric physical therapy - this allows minimizing the risk of overfatigue or trauma and supporting the patient's motivation in the initial stages, when the level of energy and willpower due to a depressive episode is low (Table 1).

Table 1

Structure of one session (45 minutes)

Stage of the lesson	Duration	Contents	HR (%) of HRmax
Warm-up	5–7 min	Easy walking at a slow pace, dynamic stretching of the main muscle groups, joint gymnastics	40–50%
Main part	30–35 min	One of the four types of aerobic exercise (walking, exercise bike, easy running, Nordic walking)	60–75%
Slowing down activity	5–7 min	Slowing down, breathing exercises, static stretching	gradual decrease to <50%

The intensity of the load was controlled by heart rate (HR) in the range of 60–75% of the maximum calculated HR, which corresponds to the generally accepted zone of «moderate intensity» according to the WHO and ACSM (American College of Sports Medicine) classification.

The maximum HR (HRmax) was calculated using the Fox formula: $HR_{max} = 220 - \text{age (years)}$. The target range for a specific patient was defined as 60–75% of the obtained value. For example, for a patient aged 35 years: $HR_{max} = 220 - 35 = 185$ beats/min; target zone = 111–139 beats/min.

The control was carried out using heart rate monitors (chest or wrist fitness trackers) in real time; The physical rehabilitation specialist adjusted the exercise pace (walking speed, resistance on the exercise bike, running pace) to keep the heart rate within the target zone throughout the main part of the session.

Additionally, the Borg Scale of Perceived Exertion (RPE, Borg Scale 6–20) was used, where the target range corresponded to 12–14 («somewhat difficult»), which served as a backup control tool in the absence or errors of the heart rate monitor readings.

1. Dosed walking

Assignment in the program: basic, «input» type of load, which was used mainly in the 1st–2nd week of the program and in patients with a low level of physical fitness at the beginning (76.7% of participants led a sedentary lifestyle before the start of the study).

- Pace: slow (3–4 km/h) in the first 1–2 weeks, with a gradual transition to an average pace (5–6 km/h) by the 4–5th week.

- Venue: flat surface — a stadium track, park or treadmill in a rehabilitation hall, which allowed avoiding terrain differences in the initial stages.

- Technique: natural posture with a straight back, gaze directed forward, breathing freely through the nose/mouth synchronously with the step (for example, 3 steps — inhale, 3 steps — exhale).

- Progression: the increase in distance and pace occurred gradually — by approximately 10% per week in accordance with the principle of safe load increase adopted in cardiorehabilitation programs.

Psychological justification: low threshold of entry does not require special skills or significant willpower, which is critically important for patients with reduced energy and anhedonia, characteristic of a depressive episode.

2. Exercise bike (stationary)

Purpose in the program: used as the main type of load for patients with excess weight, initial complaints from the musculoskeletal system (joints, spine) or for the purpose of precise dosage of the load in controlled conditions of the rehabilitation hall.

- Type of exercise machine: horizontal or vertical cycle ergometer with adjustable resistance (mechanical or electromagnetic) and built-in heart rate monitor.

- Resistance/load: selected individually so that at a pedaling frequency of 50–70 rpm the patient reaches the target heart rate zone within 5–7 minutes from the beginning of the main part.

- Body position: straight back, hands gently placed on the handlebars, knees do not go beyond the line of the toes while pedaling - controlled by a specialist to prevent discomfort in the knee joints.

- Progression: weekly increase in resistance by 5–10% or duration of continuous pedaling, provided that the target heart rate is maintained stably and the load is subjectively normal.

Practical advantage for the study: stability of external conditions (no influence of weather, relief) ensured high reproducibility of load parameters between classes, which is important for dosage control within the framework of the clinical study.

3. Easy running (jogging)

Assignment in the program: was assigned selectively - mainly to patients without significant contraindications from the cardiovascular and musculoskeletal systems, who at the 3rd–4th week demonstrated good tolerability of walking at an average pace.

- Pace: slow running while maintaining a «conversational pace» (talk test) - the patient should be able to speak freely in short sentences without shortness of breath; this is a simple clinical guideline for maintaining the aerobic (not anaerobic) load zone.

- Surface: soft surface (dirt track, tartan, treadmill with shock absorption) to reduce shock load on the joints.

- Footwear: Specialized running shoes with cushioning are recommended to prevent ankle and knee injuries.

- Progression: alternating running and walking according to the interval principle at the beginning (for example, 1 min running / 2 min walking) with a gradual increase in the proportion of running to 15–20 continuous minutes in the structure of the main part of the session by

the end of the program.

Physiological justification for the choice: compared to walking, running provides a stronger release of endorphins and a more pronounced stimulation of the synthesis of brain-derived neurotrophic factor (BDNF) - a mechanism that is considered in modern literature as one of the key pathways of the antidepressant effect of physical activity.

4. Nordic walking

Purpose in the program: used as an alternative type of exercise that allowed achieving the target heart rate with a lower subjective feeling of effort, and also introduced an element of group social interaction during outdoor activities.

- Equipment: specialized Nordic walking poles with length selection according to the formula: height (cm) $\times$ 0.68 (for moderate/healthy level of load).

- Step technique: diagonal coordination movement - right leg forward simultaneously with left pole, and vice versa; the pole is pushed behind the body, and not stuck in front, as during regular trekking.

- Muscle involvement: active work of the shoulder girdle, back muscles and arms synchronously with the work of the legs - this involves up to 90% of the body's muscles against approximately 50% during regular walking.

- Pace and distance: similar to dosed walking, with a gradual increase in distance and pace according to the same principle of 10% increase per week.

- Format: whenever possible, it was conducted in small groups (2–4 patients) under the supervision of an instructor, which added an element of social support — a factor that is considered in the literature (e.g., Schuch et al., 2018) as an additional mechanism for improving psychoemotional state.

Before starting the program, all patients underwent an assessment of their physical condition (baseline measurements of blood pressure, resting heart rate, musculoskeletal complaints) to exclude absolute contraindications to aerobic exercise.

- The exercise was stopped or reduced if shortness of breath that did not correspond to the level of exercise, chest pain, dizziness, or severe fatigue occurred.

- The principle of gradual increase (no more than ~10% increase in volume/intensity per week) was used to minimize the risk of overfatigue and injuries, which is one of the reasons why none of the participants discontinued participation in the study due to deterioration of the condition or adverse events associated with physical exercise.

- In patients who reported difficulties with motivation at the initial stages (6 people, 20%), the rehabilitation specialist used additional psychological support and flexible adjustment of the type and intensity of exercises (e.g., temporary reduction of the duration of the session with a gradual return to the target 45 minutes).

- The sessions were always conducted under the direct supervision of a physical rehabilitation specialist, which ensured control of the technique of execution, adherence to the target heart rate zone and timely response to

any patient complaints.

The choice of four types of aerobic exercise (walking, stationary bike, light running, Nordic walking), rather than one standardized protocol, allowed combining two methodological advantages:

Standardization of intensity — all types of exercise were dosed according to a single criterion (60–75% of HRmax), which ensures comparability of the load between patients regardless of the chosen type of activity;

Individualization and adherence support — the ability to alternate or choose the type of exercise according to the patient's physical condition, preferences, and motivation reduces the risk of program withdrawal, which is especially important in the population of patients with depressive episodes, who are characterized by decreased energy and motivational difficulties.

This approach is consistent with current recommendations on physical activity in depressive disorders (including the BMJ network meta-analysis, 2023, and the Li W. et al. meta-analysis, 2024), which emphasize that the key predictors of clinical effect are the total amount of moderate-intensity aerobic exercise and regular.

Statistical processing of the obtained data was carried out using descriptive statistics (calculation of means and standard deviations), Student's t-test for comparing means in independent and paired samples, as well as the χ^2 test for comparing qualitative indicators between groups. Differences were considered statistically significant at $p < 0.05$. All participants signed an informed consent to participate in the study. A search and analysis of international studies was conducted, summarized as a literature review.

The research methods used do not contradict the terms of the 2008 Declaration of Helsinki and were approved by the ethics committee of the Ivano-Frankivsk National Medical University (IFNMU) when planning a comprehensive research project, approved by the decision of the Academic Council of the IFNMU, protocol No. 19 dated December 20, 2018, on the topic: "Development and improvement of organizational and methodological foundations of physical therapy in patients with diseases of the abdominal cavity and nervous system" (state registration number 0119U000448).

Research results. According to the results of the initial questionnaire, it was found that the majority of patients in both groups, 76.7% (23 people), led a sedentary lifestyle before the start of treatment and did not adhere to the WHO recommended level of physical activity [16]. The mean HDRS-17 score at baseline was 22.4 ± 3.1 in the main group and 21.9 ± 2.8 in the control group, which corresponded to a moderate depressive episode and confirmed the comparability of the groups at baseline. The mean BDI-II score at baseline also had no statistically significant differences between the groups (28.6 ± 4.2 and 27.9 ± 3.9 , respectively; $p > 0.05$).

After eight weeks of observation, a statistically significant decrease in the mean HDRS-17 score to 11.2 ± 2.6 ($p < 0.05$) was recorded in the main group, while in the control group the similar indicator was 16.8 ± 3.0 .

Thus, the reduction of depressive symptoms in the

main group was 34.5% more pronounced compared to the control group. The dynamics of the indicators are present-

ed in Table 2.

Table 2.

**Dynamics of depressive symptomatology indicators
according to the HDRS-17 and BDI-II scales**

Indicator	Main group (n=15)	Control group (n=15)
HDRS-17, before treatment	22,4±3,1	21.9±2.8
HDRS-17, after 8 weeks	11,2±2,6*	16.8±3.0
BDI-II, before treatment	28,6±4,2	27.9±3.9
BDI-II, after 8 weeks	14,8±3,3*	20.1±3.7

Note: * - differences are statistically significant compared to the control group, $p < 0.05$.

Similar dynamics were reflected by the Beck scale indicators: in patients who joined the exercise program, the subjective assessment of their own condition improved significantly more - the average score on the BDI-II decreased to 14.8 ± 3.3 in the main group compared to 20.1 ± 3.7 in the control group ($p < 0.05$).

The obtained data are consistent with the results of large meta-analyses, in particular the study by Pearce M. et al. (2022), which established a clear relationship between regular physical activity and a reduced risk of depression [1], as well as with the conclusions of Li W. et al. (2024), which confirm the effectiveness of aerobic exercise in reducing depressive symptoms [2]. Similar results were obtained in the BMJ (2024) network meta-analysis, the authors of which noted that physical exercise as an independent or additional treatment method demonstrates a clinically significant antidepressant effect, comparable in magnitude to psychotherapy [4]. Analysis of the subjective responses of patients in the main group, obtained during the repeated questionnaire, showed that 11 (73.3%) people noted an improvement in general well-being, increased energy levels and a decrease in anxiety after 3–4 weeks of regular classes. At the same time, 3 (20%) patients reported difficulties with motivation to perform exercises at the initial stages, which emphasizes the importance of psychological support and an individual approach when implementing physical activity programs in people with depressive disorders. It is important to note that none of the participants discontinued participation in the study due to deterioration of the condition or adverse events associated with physical activity. This indicates the safety of the proposed program when adhering to the principles of gradual increase in load and individual selection of exercise intensity, which is consistent with the conclusions of Schuch F.B. et al. (2018) on the acceptability of physical activity as an additional therapeutic component for depression [6], as well as the data of Noetel M. et al. (2024) on the low level of refusals from participation in physical exercise programs compared to other methods of treating depression [4].

Discussion of results. The results of the clinical observation confirm the data of the modern scientific literature on the clinical effectiveness of structured aerobic physical activity programs as a component of complex therapy of depressive episodes. The decrease in the mean

score on HDRS-17 by 34.5% in the main group by the magnitude of the effect we found is within the range described in the network meta-analysis of Noetel M. et al. (2024) for moderate-intensity aerobic exercise [4], and is also consistent with the results of the meta-regression analysis of Heissel A. et al. (2023), which demonstrated a more pronounced antidepressant effect under the condition of supervised classes [5] - this is the format that was implemented in our study.

The obtained data also confirm the concept of a dose-dependent effect of physical activity described in the meta-analysis of Guo Z. et al. (2022): the exercise regimen we chose (45 minutes three times a week for eight weeks) corresponds to the parameters under which, according to the available data, a clinically significant antidepressant effect is achieved without an excessive risk of reducing adherence to treatment [9]. At the same time, it should be noted that the majority of patients in both groups led a sedentary lifestyle at the beginning of the study, which is consistent with the global trend towards a decrease in the level of daily physical activity of the population and emphasizes the relevance of targeted interventions aimed at increasing it.

The positive dynamics of subjective indicators of well-being, energy and anxiety, recorded after 3–4 weeks of training, can be explained by the rapid neurobiological effects of physical activity - in particular, an acute increase in BDNF levels and modulation of monoaminergic neurotransmission, described in the reviews by Jemni M. et al. (2023) [10] and Yang H. et al. (2025) [11], while a more sustained clinical improvement on the HDRS-17 and BDI-II scales is probably associated with the cumulative effect of regular exercise on neuroplastic and anti-inflammatory processes [12, 13].

The identified difficulties with motivation to perform exercises in some patients of the main group are consistent with the literature on the importance of psychological support for participants in physical activity programs, especially in the initial stages, when symptoms of anhedonia and decreased energy, inherent in a depressive episode, may interfere with regular exercise [4, 5]. This indicates the feasibility of including elements of motivational counseling and gradual, individualized load increase in the structure of physical activity programs for this category of patients.

It should also be noted the limitations of the study: a small sample ($n = 30$), a single-center nature of the observation, the lack of blinding when assessing the results, as well as a relatively short observation period (eight weeks), which does not allow assessing the long-term stability of the achieved effect. These limitations define the directions of further research, in particular the need for multicenter randomized controlled trials with a longer follow-up period and a follow-up assessment of the stability of the clinical effect after the end of the active phase of the physical exercise program. According to the literature, the largest systematic review and meta-analysis to date by Pearce M. et al. (2022), published in *JAMA Psychiatry*, combined data from 15 prospective cohort studies involving more than 191 thousand people and established a statistically significant inverse relationship between the level of physical activity and the risk of developing depression; importantly, a significant positive effect was observed even in people whose activity level was below the WHO recommended minimum, indicating the absence of a “threshold effect” [1]. These data are consistent with earlier work by Schuch F.B. et al. (2018), which based on 49 prospective cohort studies ($n=266939$) showed that individuals with a high level of physical activity have a 17% lower chance of developing depression compared to sedentary individuals [6]. The dose-dependent nature of the relationship between physical activity and the risk of depression was also confirmed in the meta-analysis of Guo Z. et al. (2022), which demonstrated a nonlinear dose-effect curve: the greatest risk reduction was observed when moving from a sedentary lifestyle to a moderate level of activity, while further increasing the load gave a less pronounced additional effect [9]. This is of important practical importance for the development of realistic, feasible recommendations for patients with a low baseline level of physical activity.

Significant interest of the scientific community in recent years has been focused on elucidating the molecular mechanisms underlying the antidepressant effect of physical exercise. A co-centometric analysis by Yang H. et al. (2025), which covered 170 key studies from 2006–2024, identified seven main clusters of mechanisms, among which the leading place is occupied by modulation of neurotransmitter systems (serotonergic, GABAergic), increased expression of brain-derived neurotrophic factor (BDNF), and enhanced hippocampal neurogenesis and synaptic plasticity [11]. A review by Jemni M. et al. (2023), who summarized data from over 100 publications over 20 years, confirmed a stable relationship between acute and prolonged physical activity and an increase in peripheral BDNF levels, which correlates with a decrease in the severity of depressive symptoms and an increase in neuroplastic processes [10].

In addition to the neurotrophic pathway, the anti-inflammatory effect of regular physical activity plays an important role: according to the review by Murawska-Ciałowicz E. et al. (2021), physical exercise reduces the level of pro-inflammatory cytokines (IL-6, TNF- α), modulates the activity of the kynurenine pathway of tryptophan metabolism and contributes to the normalization of the func-

tioning of the hypothalamic-pituitary-adrenal axis, which together reduces the neuroinflammatory load characteristic of depressive disorder [13].

Thus, the antidepressant effect of physical activity is realized through a complex of interconnected neurobiological mechanisms, and not through a single isolated pathway.

The largest network meta-analytic evaluation of the effectiveness of different types of physical exercise in the treatment of major depressive disorder to date was performed by Noetel M. et al. (2024) in the *BMJ*. The authors analyzed 218 randomized controlled trials ($n=14170$) and found that moderate to large effects on improving depressive symptoms compared with active control were demonstrated by walking/jogging, yoga, strength training, and their combination with cognitive behavioral therapy; with the highest acceptability (lowest rate of refusals to participate) being achieved by strength training and yoga [4]. The authors emphasized that the effectiveness of physical exercise as a method of treating depression is comparable in effect size to psychotherapy and pharmacotherapy, and the best results are achieved with a supervised (supervised by a specialist) training regimen.

Similar conclusions are contained in a meta-analysis with meta-regression by Heissel A. et al. (2023), published in the *British Journal of Sports Medicine*: based on 41 studies, a moderate antidepressant effect of exercise compared with inactive controls (standardized mean difference ranging from -0.99 to -0.34), with the magnitude of the effect increasing with supervised exercise and sufficient duration of the program [5]. An updated systematic review and meta-regression of randomized controlled trials (2026) also confirmed the effectiveness of supervised exercise programs as a stand-alone treatment for depressive disorder in adults, indicating the importance of adherence to the protocol and regularity of exercise to achieve a sustained clinical effect [14].

Of particular note is the evidence on the effectiveness of physical activity in younger age groups. A meta-analysis by Li W. et al. (2024), which included studies involving individuals aged 6–35 years, found that the optimal antidepressant effect of aerobic exercise is achieved with a duration of 75–120 minutes three times a week for at least eight weeks [2]. Slightly shorter optimal parameters (30 minutes, four times a week for six weeks) for adolescents with depressive disorders were described by Wang X. et al. (2022), while emphasizing that aerobic exercise is more effective than body-oriented practices (in particular yoga) in reducing actual depressive (and not just subclinical depressive) symptoms in this age group [3]. This emphasizes the need for a differentiated approach to the choice of modality and dosage of physical activity depending on the age and clinical severity of the patient's condition.

It is also noteworthy that the antidepressant effect of exercise is not limited to aerobic exercise. A systematic review and meta-analysis by Bidzan-Wiącek M. et al. (2024) demonstrated a statistically significant antidepressant effect of strength training in men with depression or depressive symptoms, regardless of program intensity [8],

which expands the arsenal of available non-pharmacological interventions for patients for whom aerobic exercise is contraindicated or less acceptable. An important aspect of implementing physical activity programs in clinical practice is their safety and acceptability for patients. According to a network meta-analysis by Noetel M. et al. (2024), the rate of refusals from participation in physical exercise programs was comparable to that of pharmacotherapy and psychotherapy, and no serious adverse events related to physical exercise were recorded [4]. The effectiveness and safety of physical activity as an auxiliary method for correcting depressive symptoms has also been confirmed in patients with comorbid somatic and neurological pathology: in particular, the meta-analysis of Tian J. et al. (2022) demonstrated a moderate statistically significant reduction in the severity of depression against the background of regular physical exercise in patients with Parkinson's disease (standardized mean difference -0.60 ; 95% CI from -0.79 to -0.41) [15], which indicates the universality of the antidepressant effect of motor activity regardless of the main diagnosis. Summarizing the above data, it can be stated that modern evidence-based medicine considers structured, individualized physical activity not as an auxiliary, but as a full-fledged component of complex therapy for depressive episodes, the effectiveness of which has been confirmed at the level of systematic reviews, meta-analyses and network meta-analyses of randomized controlled trials. At the same time, the questions of the optimal duration of the maintenance phase of the program, the long-term stability of the achieved effect, and the personalization of the intervention taking into account the clinical and psychological characteristics of the patient remain open, which led to the conduct of our own clinical observation, the results of which are presented below.

Conclusions.

1. The inclusion of a structured aerobic physical activity program in the complex treatment of depressive episodes provides a statistically significant reduction in depressive symptoms: the reduction in HDRS-17 scores in the main group was 34.5% more pronounced compared to the control group that received only drug therapy.

2. Aerobic exercises of moderate intensity lasting 45 minutes three times a week for eight weeks are a safe and effective non-drug method for correcting depressive states,

which is consistent with the optimal dosage parameters established in modern meta-analyses.

3. The majority of patients with depressive episodes (76.7%) led a sedentary lifestyle before the start of treatment and did not adhere to the recommended level of physical activity, which indicates the need for targeted work to increase the motor activity of this category of patients.

4. Subjective improvement in general well-being, increased energy levels and decreased anxiety were noted by 73.3% of the main group participants after 3–4 weeks of regular classes, which emphasizes the rather rapid therapeutic effect of physical exercises, probably associated with acute neurobiological changes (modulation of BDNF and monoaminergic neurotransmission).

5. Difficulties with motivation to perform physical exercises at the initial stages were noted by 20% of patients, which indicates the importance of psychological support and an individual approach when implementing physical activity programs in this group of patients.

6. The obtained results are consistent with the data of modern international systematic reviews and meta-analyses and confirm the feasibility of developing and widely implementing individualized physical activity programs as a mandatory component of complex therapy of depressive episodes along with drug treatment and psychotherapy.

Prospects for further research include conducting studies of the impact of physical exercise on the dynamics of symptoms in depressive disorders with a longer observation period to assess the stability of the achieved clinical effect.

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ВПЛИВ ФІЗИЧНИХ ВПРАВ НА ДИНАМІКУ СИМПТОМАТИКИ У ПАЦІЄНТІВ З ДЕПРЕСИВНИМИ ЕПІЗОДАМИ

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Резюме. У роботі розглянуто роль фізичних вправ як важливого немедикаментозного компонента комплексної терапії пацієнтів із депресивними епізодами. На основі аналізу сучасних наукових джерел, зокрема систематичних оглядів, метааналізів та мережних метааналізів рандомізованих контрольованих досліджень, опублікованих переважно протягом останніх п'яти років, узагальнено дані щодо епідеміологічного зв'язку рухової активності та ризику депресії, нейробиологічних механізмів антидепресивної дії фізичних вправ (модуляція BDNF, моноамінергічних систем, зниження нейрозапалення), а також порівняльної ефективності різних видів навантаження (аеробні, силові, тілесно-орієнтовані практики).

Під час клінічного спостереження за 30 пацієнтами з депресивним епізодом встановлено, що включення структурованої програми аеробних вправ до стандартної медикаментозної терапії супроводжується статистично значущим і клінічно вагомим зниженням вираженості депресивної симптоматики за шкалами HDRS-17 та BDI-II порівняно з контрольною групою. Обґрунтовано доцільність інтеграції індивідуалізованих програм фізичних вправ до складу комплексної реабілітації пацієнтів із депресивними розладами. Перспективним напрямком подальших досліджень є оптимізація режимів фізичних навантажень залежно від клінічного перебігу депресивних епізодів та вивчення довгострокової стійкості досягнутого ефекту.

Висновки.

1. Включення структурованої програми аеробної фізичних вправ до комплексного лікування депресивних епізодів забезпечує статистично значуще зниження депресивної симптоматики: редукція балів за шкалою HDRS-17 в основній групі виявилася на 34,5% більш вираженою, порівняно з контрольною групою, яка отримувала

лише медикаментозну терапію.

2. Аеробні вправи середньої інтенсивності тривалістю 45 хвилин тричі на тиждень протягом восьми тижнів є безпечним та ефективним немедикаментозним методом корекції депресивних станів, що узгоджується з оптимальними параметрами дозування, встановленими в сучасних метааналізах.

3. Більшість пацієнтів із депресивними епізодами (76,7%) до початку лікування вели малорухливий спосіб життя та не дотримувалися рекомендованого рівня фізичної активності, що свідчить про необхідність цілеспрямованої роботи з підвищення рухової активності цієї категорії хворих.

4. Суб'єктивне покращення загального самопочуття, підвищення рівня енергії та зниження тривожності відзначили 73,3% учасників основної групи вже після 3-4 тижнів регулярних занять, що свідчить про достатньо швидкий терапевтичний ефект фізичних вправ, ймовірно пов'язаний із гострими нейробіологічними змінами (модуляцією BDNF та моноамінергічної нейротрансмісії).

5. Труднощі з мотивацією до виконання фізичних вправ на початкових етапах відзначили 20% пацієнтів, що вказує на важливість психологічного супроводу та індивідуального підходу під час впровадження програм фізичної активності у цій групі хворих.

6. Отримані результати узгоджуються з даними сучасних міжнародних систематичних оглядів і метааналізів та підтверджують доцільність розробки й широкого впровадження індивідуалізованих програм фізичної активності як обов'язкового компонента комплексної терапії депресивних епізодів поряд із медикаментозним лікуванням та психотерапією.

Ключові слова: фізична терапія, реабілітація, депресивні епізоди, фізичні вправи, аеробні вправи, нейротрофічний фактор мозку, психоемоційний стан, когнітивні функції, якість життя, немедикаментозна терапія депресивних епізодів.

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