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STAN, PROBLEMY, PERSPEKTYWY.**

***TOM 11: KOGNITYWNE HORYZONTY –
PERSPEKTYWY DLA NAUKI I EDUKACJI***

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РЕЗУЛЬТАТИ, ПРОБЛЕМИ, ПЕРСПЕКТИВИ.**

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ПЕРСПЕКТИВИ ДЛЯ НАУКИ ТА ОСВІТИ***

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EFFECTIVENESS OF USING DANCE AND MOVEMENT THERAPY IN PHYSICAL REHABILITATION OF CHILDREN SICK OF BRONCHIAL ASTHMA

The peculiarities of the synergistic method of physical rehabilitation with the use of dance and movement therapy for children 10-14 years old with bronchial asthma are revealed. The effectiveness and accessibility of the proposed complex program of physical therapy and occupational therapy in integration with dance exercises for children with bronchial asthma has been experimentally proven. Its impact on the correction of the developmental characteristics of children of this nosology and the possibility of their social integration is analyzed. An improvement in the clinical picture was found in 60% of children with bronchial asthma in the main group, while in the control group such changes were observed in only 47% of clients. Researches have shown that in the main group, 75.4% of children with bronchial asthma experienced a stable remission, and 24.6% had episodic attacks that progressed in a smoothed form (unstable remission).

One of the important modern problems is bronchial asthma among children, which has recently become widespread in the world [1, 14]. In the 60s of the XX century, 0,2–0,4% of children suffered from bronchial asthma, in the 1980s the incidence increased to the level of 1,5–3,0%. At the end of the 90s, in some regions of the globe, the incidence of this disease among children reached 6–8%, and at the turn of the 20th – 21st centuries – 10–12% of children suffered from bronchial asthma [2, 15]. In recent years, an increase in the formation of severe forms of asthma and an increase in disability and mortality due to this disease have been recorded [9, 16].

The modern medical and pharmaceutical industry has made significant progress in the development of a variety of medicinal anti-asthmatic drugs, however, the results of therapy, which can last for a child for many years, do not always satisfy the doctor, the patient and his parents [10]. There is an increase in the frequency of allergic and adverse reactions to medicines, the formation of resistance to various drugs [4, 18]. Non-pharmacological methods of therapy prevent the progression of the disease, reduce the risk of side effects to drugs, but this group remains insufficiently studied and are used mainly in the period of subsiding exacerbations and remissions of moderate and mild bronchial asthma [5].

During the implementation of complex restoration and rehabilitation measures, the formation of remission occurs due to the restoration of the human body's own compensatory capabilities. Physical therapy and ergotherapy determine the restoration of the function of external breathing, normalization of

blood circulation, improvement of the adaptive capabilities of the respiratory and cardiovascular systems to physical exertion, strengthening of the chest muscles (including the bronchoalveolar apparatus) with increased mobility of the spine, ribs, diaphragm, increase of body resistance, improvement of metabolic processes, normalization of functions of the central nervous system [7, 11]. However, the general disadvantage of these methods is that the positive effect does not come immediately, but after a long period, sometimes repeated courses are necessary, the implementation of which requires significant efforts of the sick child and his parents.

It should be noted that the currently available restorative treatment scheme for children with bronchial asthma does not solve the rather important task of social integration of children with this nosological form, taking into account the peculiarities of their psychophysical and psychoemotional development. In the rehabilitation of children with bronchial asthma, in addition to drug treatment and means of physical rehabilitation, means and forms of adaptive physical culture are widely used. Adaptive physical culture and sports are a necessary part of the daily life of children with bronchial asthma, which solves the task of their social integration [12].

In our country, almost no attention has been paid to this problem until now. In this regard, the search and development of new scientifically based and effective programs for improving the health of children with bronchial asthma, restoring their working capacity, social rehabilitation and adaptation in society remain relevant. There is a need to apply new approaches and organizational forms of an integrated approach to the rehabilitation of children of this nosology, which are based on various forms of adaptive physical culture [8].

In the complex therapy of children suffering from bronchial asthma, the means and forms of physical rehabilitation are a factor in the health-improving effect on the child's body. At all stages of physical therapy and occupational therapy for children with bronchial asthma, various methods are widely used [6, 13, 17]. It's mainly aimed at improving the activity of the respiratory system, but bronchial asthma is a disease not only of the bronchopulmonary system, but also of the whole body, and primarily of the central and autonomic nervous system, that is, it is a psychosomatic disease, therefore complex physical rehabilitation should be directed not only on the correction of disorders of the respiratory system, but also on the whole body, in particular on the central and autonomic nervous system.

In this aspect, the technique of integrated use in the rehabilitation process of dance-motor therapy could play a big role; however, there is practically no information in the literature about the effect of dance exercises, the action of which is aimed at the central and autonomic nervous system, the emotional sphere of children with bronchial asthma.

In connection with the growth and prevalence of functional neuropsychological abnormalities in children with bronchial asthma, a serious

question arises about ways to protect the psycho-emotional sphere of a young growing organism that undergoes a large educational load in combination with hypodynamia. In 60% of children, a depressive or subdepressive state is noted, which is expressed in low mood, indifference, loss of interest in life, thoughts about one's own inferiority. They experience significant difficulties in verbalizing their experiences (for many of them, one of the factors provoking an attack is an emotional experience, regardless of whether it is positive or negative). In these children, the ability to express their state with the help of symbols is not sufficiently developed; body language remains the only way to express their emotional state [3].

Taking into account these features of children with bronchial asthma, we can conclude that dancing, as one of the forms of adaptive physical culture; helps solve the task of correcting the psychophysical and psychoemotional state of children already at the stage of physical rehabilitation, as well as their further social integration. This determines the relevance of the researched topic.

The research aim of the work is to develop a synergistic method of physical rehabilitation of children with bronchial asthma, including dance exercises, and to study its effect on the correction of the developmental characteristics of children with this nosology and the possibility of their social integration.

Children of secondary school age 10-14 years old with chronic form of bronchial asthma (according to medical records), a total of 40 patients, were selected for the experiment. Of these, 20 children received medical treatment, physical therapy, therapeutic massage № 10 – the control group (CG). The main group (MG) consisted of 20 children who, against the background of drug treatment, were engaged in the original synergistic rehabilitation program. It included: classical massage, breathing gymnastics, gymnastics on balls, and elements of choreography, improvisation, mobile games, asthma school, and classes with breathing simulators at home.

During the experiment, the following research methods were used: analysis, systematization and generalization of data from scientific and methodological and special literary sources, sociological methods (study of medical records, survey according to the «Quality of life» scales), pedagogical methods (pedagogical observation, pedagogical experiment), analysis of cardio – vascular activity (pulsometry), study of the function of external respiration (parameters definition of PEV, VFE₁, MVV₂₅, MVV₅₀, MVV₇₅), assessment of general physical capacity, methods of mathematical statistics.

VFE₁ – volume of forced exhalation in 1 second is the most demonstrative indicator of bronchial obstruction (in liters); MVV₂₅, MVV₅₀, MVV₇₅ – the maximum volume velocity at the level of 25, 50, 75% of forced exhalation, characterizes changes at the level of large, medium and small bronchi (liters per second).

General physical capacity is an integral indicator of the functional state of the cardiorespiratory system and reflects some objective characteristics of the patient:

anthropometric parameters, physique, harmony of physical development, strength and endurance of muscles, the state of the musculoskeletal system, endocrine system. Individual assessment of this parameter is used to calculate differentiated physical loads, both in healthy people and in patients with various pathologies.

By definition, physical capacity is a value expressed in the load power at which the heart rate reaches 150 beats per minute. The method is based on the existence of a linear relationship between the value of the given load and the heart rate under this load.

The PWC_{150} test with the following initial conditions was used to determine general physical performance: the test consisted of two 5-minute loads on a bicycle ergometer; the frequency of pedaling was constant for all children – 60 revolutions per minute; the value of the 1st load was equal to 1 W/kg of the child's weight, the 2nd – 1,5 W/kg. There was a 10-minute rest interval between loads.

Mathematical calculations of the level of general physical capacity were carried out according to the formula proposed by V. L. Karpman:

$$PWC_{150} = W_1 + (W_2 - W_1) \cdot \frac{150 - f_1}{f_2 - f_1},$$

where W_1 and W_2 – values of the 1st and 2nd loads in W;

f_1 and f_2 – pulse rate at the end of the 1st and 2nd loads.

The average values researches of the heart rate (HR, table 1) showed that the initial values of the indicator in both studied groups of children probably did not differ ($p < 0,05$). So, in the MG group the heart rate at rest was $83,5 \pm 7,2$, in the middle of the lesson – $142,8 \pm 15,6$, at the end of the lesson – $84,9 \pm 7,0$ beats/minute, in the CG – $84,5 \pm 8,7$, $143,7 \pm 15,5$, $85,6 \pm 8,9$ beats/minute in accordance.

Statistical processing according to the student's t-test showed a high level of significance of the differences between both groups after classes according to the proposed synergistic program of the main group of children with bronchial asthma. Measurements conducted at the end of the complex rehabilitation course indicate that in MG compared to CG, the improvement in the functional state of the cardiovascular system was significantly higher ($p < 0,05$). In MG, there was a smaller increase in maximum heart rate in the middle of the session and a faster recovery after exercise.

Table 1

Value of heart rate (HR) of children with bronchial asthma during the experiment period (M±m)

HR, beats/minute	MG	CG	t
Day off on the 1st day			
in peace	83,5±7,2	84,5±8,7	0,61
in the middle of class	142,8±15,6	143,7±15,5	0,29
at the end of the lesson	84,9±7,0	85,6±8,9	0,42
At the end of the course			
in peace	80,5±7,4	82,8±7,9	1,48
in the middle of class	138,7±14,9*	142,5±16,9*	2,3
at the end of the lesson	80,9±7,1*	85,5±8,3*	2,9

Note: *p<0,05 compared to baseline.

In the table 2 and Fig. 1 shows the changes in the peak expiratory velocity (PEV) during the experiment in both studied groups of children with bronchial asthma. In the course of the study, the PEV data, recorded by patients in self-monitoring diaries, were analyzed. The developed synergistic program of physical rehabilitation showed its positive effect on the change in the PEV in children with bronchial asthma of the main group: after the experiment, this indicator increased by an average of 6.8% (p<0,05) and was equal to 91,5±15,3% from the proper value. In adolescents with bronchial asthma, the control group of PEV increased by 4,5% (p>0,05) and reached 87,8±13,8% of the appropriate value.

Table 2

The dynamics of the average peak expiratory velocity (PEV) of children with bronchial asthma before and after the experiment (M±m)

PEV, % from proper value	n	Measurement time		Increase, %
		day off	final	
Main group	20	84,7±12,6	91,5±15,3*	6,8
Control group	20	83,3±12,1	87,8±13,8*	4,5

Note: *p<0,05 compared to baseline.

Changes in the average indicators of the external breathing function of patients of both groups during the experiment are presented in the table 3. Comparison of indicators of the function of external breathing (VFE₁, MVV₂₅, MVV₅₀, MVV₇₅) before rehabilitation in both groups showed that there were no significant differences between them (p>0,05): in MG, FEV₁ was 72,3±12,8%, MVV₂₅ – 62,4±12,1%, MVV₅₀ – 59,9±14,5%, MVV₇₅ – 49,3±14,8% of the proper value; in CG, these indicators were equal, respectively – 74,5±11,7%, 61,7±13,2%, 60,1±12,9%, 50,5±13,9% of the proper value.

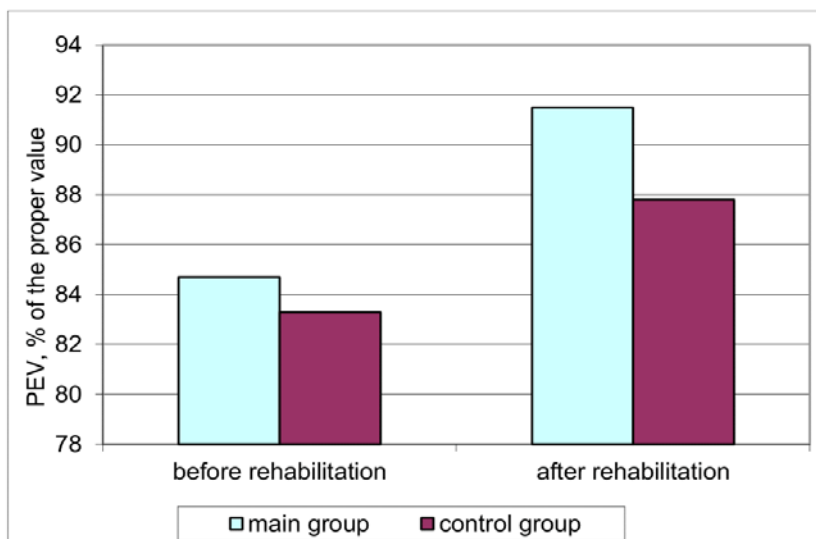


Fig. 1. Changes in the average peak exhalation speed of children with bronchial asthma during the experimental period.

Table 3

Dynamics of average indicators of external breathing function of children with bronchial asthma before and after the experiment (M \pm m)

Indexes function of external respiration (% from the proper value)	n	Group	Measurement time		Increase, %
			Output data	At the end of the course	
VFE ₁	20	main,	72,3 \pm 12,8	80,3 \pm 8,9*	8,0
	20	control	74,5 \pm 11,7	78,9 \pm 9,4	4,4
MVV ₂₅	20	main,	62,4 \pm 12,1	73,7 \pm 10,3*	11,3
	20	control	61,7 \pm 13,2	67,8 \pm 16,6	6,1
MVV ₅₀	20	main,	59,9 \pm 14,5	73,1 \pm 15,2*	13,2
	20	control	60,1 \pm 12,9	66,7 \pm 13,8	6,6
MVV ₇₅	20	main,	49,3 \pm 14,8	63,1 \pm 11,2*	13,8
	20	control	50,5 \pm 13,9	57,0 \pm 10,1	6,5

Note: *p<0,05 compared to baseline.

Research conducted at the end of the implementation of the synergistic rehabilitation program among children of OG revealed a significant increase (p<0,05) in the average indicators of the function of external breathing compared to the initial level: VFE₁ increased by 8,0% and amounted to 80,3 \pm 8,9%, MVV₂₅ – by 11,3% (73,7 \pm 10,3%), MVV₅₀ – by 13,2% and became 73,1 \pm 15,2% of the proper

value, the patency of the small-caliber bronchi has improved significantly, as evidenced by the increase of MVV_{75} by 13,8% ($63,1 \pm 11,2\%$ of the proper value).

Changes in the average indicators of the function of external breathing in CG were less significant and not reliable ($p > 0.05$): VFE_1 increased by 4,4% and amounted to $78,9 \pm 9,4\%$, MVV_{25} – by 6,1% ($67,8 \pm 16,6\%$), MVV_{50} – by 6,6% and reached $66,7 \pm 13,8\%$, MVV_{75} – by 6,5% ($57,0 \pm 10,1\%$ of the proper value).

Observations of patients continued throughout the year: research on the function of external breathing and the general course of the disease, analysis of children's medical records, conversations with parents. The results of long-term studies showed that in MG, 75,4% of children had a stable remission of bronchial asthma, in 24,6%, the attacks began to have an episodic nature and proceed in a more smoothed form (unstable remission), in CG, these indicators respectively were 36,7% and 63,3%.

At the end of the entire course of restorative therapy for children aged 10–14 with bronchial asthma, coordination of movements increased, motor discomfort decreased, children became more confident in their own body, and could perform exercises for a much longer time without being distracted. There was a desire not only to perform tasks correctly, but also to help others.

It should be noted that the actual data on the «Severity of Asthma» scale have not changed. At the beginning of the implementation of the developed synergistic rehabilitation program, the indicator on this scale was 52% of the maximum possible, at the end it remained at the same level (Fig. 2). In our opinion, this is due to the small-time interval that occupied a full course of rehabilitation classes. Children with bronchial asthma, when answering the questions related to this scale (for example, «How often do you have asthma exacerbations lately?»), had certain difficulties in assessing the dynamics of their health during this period of time.

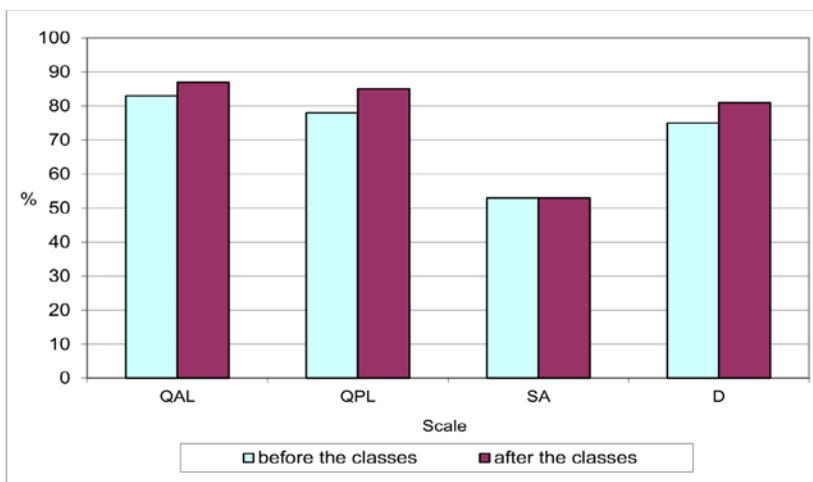


Fig. 2. Dynamics of changes in indicators according to the scales of the «Quality of life» survey: QAL – quality of active life, QPL – quality of passive life, SA – severity of asthma, D – distress.

Changes according to the «Distress» scale were as follows: at the beginning of the classes, the average score was 76%, at the end – 83% of the maximum possible value. Children emotionally began to experience their condition as worse, this does not contradict the increase in indicators on the «Quality of active life» and «Quality of passive life» scales. Dance exercises are a physical load on the body. This load is carefully selected and strictly dosed, but it exceeds the usual physical load of these children. A controlled stressful situation with which the child can cope is simulated. This is a positive factor, because it teaches the body to adequately respond to a stressful situation, which is a significant difficulty for children suffering from bronchial asthma (a similar stress for the body is created during mountain air therapy, when the child has to breathe a mixture depleted of oxygen).

According to the scale «Quality of active life» (Fig. 2), before attending classes, the average score was 82% of the maximum possible value; after attending classes, the corresponding score was 88%. Children began to get more satisfaction from their own activity, they performed exercises with joy.

According to the «Quality of passive life» scale, before the asthma school, the average indicator was 78% of the maximum possible, after – it increased to 85%. Activities not associated with increased physical activity: reading, drawing, designing, other favorite hobbies, subjectively began to be experienced as those that bring more joy.

The conducted study shows that a synergistic technique using dance-motor therapy affects the emotional sphere of a child suffering from bronchial asthma, increasing the subjective experience of pleasure from active activities. As a result of classes using this method, children better feel their body, their physical capabilities.

Analysis of data from the «Quality of Life» survey and observation of children show that the difficulties that children with bronchial asthma overcome during classes increase their independence and self-confidence. It was found that in the post-rehabilitation period, a significant part of the children of the MG – 48% (against 20% of the CG) began to engage in physical culture and sports (swimming, athletics, football, etc.), which is undoubtedly one of the positive results of the implementation of the synergistic rehabilitation program.

On the basis of the conducted experimental study of the effectiveness of the use of dance and movement therapy in the physical rehabilitation of children with bronchial asthma, the following conclusions can be formulated:

1. At the end of the pedagogical experiment, among children with bronchial asthma in the main group, a significant ($p < 0,05$) increase in the average indicators of the function of external breathing compared to the initial level was found: VFE_1 increased by an average of 8,0%, MVV_{25} – by 11,3%, MVV_{50} – by

13,2%, the patency of small-caliber bronchi has improved significantly, as evidenced by the increase of MVV_{75} by 13,8%. The dynamics of the average indicators of the function of external breathing in the control group was less significant and not reliable ($p > 0,05$): VFE_1 increased on average by 4,4%, MVV_{25} – by 6,1%, MVV_{50} – by 6,6%, MVV_{75} – by 6,5%.

2. Heart rate researches conducted after the implementation of the experimental rehabilitation program indicate an improvement in the functional state of the cardiovascular system in children with bronchial asthma in the main group compared to the control group: there was a smaller increase in the maximum heart rate in the middle of the session and a faster recovery after physical exercise load.

3. Analysis of data from the «Quality of Life» questionnaire and observation of children with bronchial asthma show that classes according to the proposed synergistic method of physical rehabilitation using dance-motor therapy increase children's independence and self-confidence expand motor capabilities, which indicates their social integration. There was an increase in indicators on the following scales: «Distress» – by 6%, «Quality of active life» – by 6%, «Quality of passive life» – by 7%.

4. The experiment proved the effectiveness and availability of the developed synergistic method of physical therapy and occupational therapy using dance exercises for children with bronchial asthma 10-14 years old. An improvement in the clinical picture of the disease was found in 60% of children in the main group, while in the control group such changes were observed in only 47% of clients. Researches have shown that in the main group, 75,4% of children with bronchial asthma were in stable remission, and in 24,6%, the attacks became episodic and progressed in a smoothed form (unstable remission).

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STAN, PROBLEMY, PERSPEKTYWY.

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I EDUKACJI*

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Jan Grzesiak, Ivan Zymomyra, Vasyl Pynytskyj

РОЗВИТОК СУЧАСНОЇ ОСВІТИ І НАУКИ:
РЕЗУЛЬТАТИ, ПРОБЛЕМИ, ПЕРСПЕКТИВИ.

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