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**PHYSICAL REHABILITATION OF DISABLED PEOPLE WHO HAVE SUFFERED A STROKE
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Abstract. The aim - is to increase the effectiveness of the physical therapy program for patients with the consequences of a hemorrhagic stroke with the help of differentiated application of rehabilitation measures depending on the severity of the neurological disorder and concomitant diseases. Materials and methods. 100 patients were observed in the neurorehabilitation center of the Ivano-Frankivsk Regional Clinical Hospital. (50 men and 50 women, average age 63.57 ± 0.43 years) in the early post-stroke recovery period. All patients were clinically and neurologically examined according to a specially developed protocol according to modern scales - NIHSS, mRS on the 10th, 30th, 90th and 180th day of the disease and differentiated treatment in accordance with the standards and protocols of care for patients who have suffered a stroke. The patients were divided into four groups of 25 patients each. The first group included patients with hemorrhagic stroke, among whom the severity of post-stroke disorders was mild (NIHSS score ≤ 7 points), without concomitant diseases. The second group consisted of patients with a mild degree of post-stroke disorders (NIHSS score ≤ 7 points) and concomitant pathology (heart pathology, diabetes, chronic obstructive pulmonary disease of the II stage). The third group included patients with intracerebral stroke, among whom the severity of post-stroke disorders was moderate and obvious (NIHSS score > 7 points), without concomitant pathology. The fourth group consisted of patients with moderate severity of post-stroke disorders (NIHSS status > 7 points) and accompanying pathology. A statistical analysis of the use of descriptive statistics methods was carried out. The relationship between qualitative features was assessed using the χ^2 Pearson test. The results. According to the results of treatment, among the patients of group I, 20 patients (80.0%) (mRS index 0–2) had a favorable course. In group I, a relatively favorable result (mRS index ≥ 3 points) was achieved only in 5 patients (20.0%); in the II group, a positive result was achieved in 17 patients (72.0%), a relatively favorable result was achieved in 8 (28.0%); in group III - a favorable result was achieved in 15 patients (60.0%), relatively favorable - in 10 (40.0%), and in group IV - a favorable result was found only in 14 patients (56.0%), relatively favorable - in 11 (44.0%).

Conclusions. The assessment of the functional state of disabled people in the early period of a stroke made it possible to establish that the basis of their low motor activity lies in: walking disorders (41% of disabled people), balance functions (35.9%), a decrease in the strength and endurance indicators of muscle groups that have preserved their functionality, low level of adaptive potential of the circulatory system (56.4%), dysregulation of neuropsychological processes. Differentiated application of the program of rehabilitation and physical therapy in post-stroke patients in different groups, taking into account the severity of neurological disorders of the recovery period and the selection of methods and methods of treatment, leads to a significant increase in the effectiveness of rehabilitation measures.

Keywords: stroke, physical therapy, rehabilitation, severity of neurological disorders, concomitant pathology.

Introduction. Acute cerebrovascular accident (ACC), as one of the most frequent causes of disability and mortality, causes great moral and material damage to the population in all countries of the world [3, 9]. The total number of disabled people with disorders of the nervous system in Ukraine is more than 1 million people, among them the contingent of patients with cerebrovascular pathology is in the first place [4, 8]. Disability after a stroke reaches 3.2 per 10,000 population, which determines the first place among all causes of primary disability and is caused, first of all, by the severity of impaired motor functions, disorders of the cognitive-intellectual and verbal spheres, and psychological and social maladaptation. After a stroke, not more than 15% of patients return to work [5]. Therefore, the most important problem is the improvement of the rehabilitation system of persons who have suffered an intracerebral stroke. Nowadays, the greatest effectiveness of rehabilitation is noted in the acute and early period of a stroke, the first six months [6]. Recovery can occur at

a later date [7], and the duration of rehabilitation measures is not limited by time. However, there are not enough scientifically developed physical therapy programs dedicated to the rehabilitation of patients in the remote post-stroke period. There are almost no technologies aimed at comprehensive recovery of the physical and psycho-social sphere of post-stroke patients in the late residual period. This determined the relevance of our work. The work was carried out according to the research plan of Vasyl Stefanyk Prykarpattia National University.

Purpose, work tasks, material and methods.

The purpose of the work is to develop and substantiate the complex methodology of physical rehabilitation of disabled people in the late post-stroke period.

The task of the research. to evaluate the state of motor activity of disabled people in the late post-stroke period, to develop a comprehensive program of physical therapy for disabled people with the consequences of a stroke based on the tasks of increasing their motor activity,

to find out the effectiveness of the developed technique on the state of the muscular system, restoring orthostatics and improving walking in disabled people with consequences of a stroke.

Research material and methods. During the research, the following methods were used: analysis and generalization of data from scientific and methodological and special literature, sociological methods (study of medical documentation, surveys), clinical methods (somatoscopy, anthropometry, instrumental and visual assessment of motor activity (OMRON-202E pedometer, movement index scale), functional (hand dynamometry, testing the level of strength endurance of various muscle groups, assessment of vertical posture stability, assessment of adaptation potential [1]).

Methods of mathematical statistics. 40 disabled people with stroke consequences took part in the study - 10 men (25.0%) and 29 women (72.5%) aged 24 to 68

years. The age group from 40 to 60 years old was the most numerous - 23 patients (57.5%). Disabled persons with a duration of the late period of stroke for more than 3 years were represented by 18 persons (45.0%). Ischemic stroke was diagnosed in 28 people (70.0%), hemorrhagic in 11 disabled people (27.5%).

Research results. The analysis of the results (Table 1) showed that after the rehabilitation measures, the anthropometric parameters of the arm and leg segments of the disabled improved by 8% on the side of the hemiparesis in the shoulder, 11% in the forearm ($p < 0.05$), and by 14% on the healthy side, respectively and 9% ($p < 0.05$). The thigh muscles increased their parameters by 7%, the lower legs by 5% ($p < 0.05$) on the hemiparetic side, by 14% and 9%, respectively, on the healthy side. Therefore, physical rehabilitation methods improve the function of muscle groups of the upper and lower extremities.

Table 1
Anthropometry of limb segments of disabled people with the consequences of a stroke before and after a physical therapy program ($\bar{X} \pm \delta$, $p < 0.05$)

Area measurement (middle third)	Circumference dimensions, centimeters			
	Healthy side		Hemiparetic side	
	Before	After	Before	After
Shoulder	31.3±1.7	35.7±2.3	26.1±1.3	28.2±1.6
Forearm	27.1±1.3	29.6±1.4	23.5±1.1	26.0±1.1
Thigh	47.3±2.1	54.0±2.8	43.0±2.2	46.1±2.3
Shin	35.6±1.4	39.1±1.7	31.6±1.1	33.1±1.5

At the beginning of rehabilitation. 41% of disabled people moved independently, but their gait was changed, fatigue was felt; 23% of patients walked with great difficulty and needed an escort; 30.9% of disabled people used additional support when walking. Low ability to walk independently (4 points) was observed in 12 people: in 4 disabled people (10.0%) with the duration of the consequences of the disease for more than 3 years; in 6 (15.0%) - from 2 to 3 years and in 2 (5.0%) - up to 1 year, that is, the motor capabilities of these patients were determined by the degree of paresis. Among disabled people with a walking score of 2-3 points, 14 disabled people (35.0%) had a disease duration of more than 3 years, 11 (27.5%) - 2-3 years, 2 (5.0%) - less than a year. These data allow us to state that long-term motor activity (more than 3 years) has a positive effect on the walking condition of disabled people with post-stroke consequences. At the end of the experiment, the number of disabled people with a rating of 4 points decreased to 6; the score of 1 point was preserved in 2 disabled persons (5.0%); the number of people with a score of 2 increased to 25 (62.5%). Visual changes in walking under the influence of the course of physical therapy were noted in 32 patients, that is, in the majority of disabled people (79.5%). Assessment of the motor properties of the patients before and after the experiment showed that 38 people (94.9%) began to move independently (Fig.1).

The duration of walking at an arbitrary pace before the need to rest or stop due to signs of fatigue in people with the consequences of a stroke (Table 2).

Before the experiment was different and only 2 disabled people (5.0%) could walk at an arbitrary pace for more than an hour. The possibilities of approximately half of the people (49.5%) were limited to a period of free walking up to 30 minutes.

The duration of walking up to 60 minutes after the rehabilitation course was noted in 12 disabled people (30.0%) in comparison with 8 (20.0%) before rehabilitation. The number of people who can withstand a 45-minute walk has also increased, which indicates the formation of stable motor adaptation. A low level of walking ability (up to 15 minutes) remained in 6 (15.6%) disabled people who have severe hemiparesis and need additional support.

The assessment of the stability of the vertical posture of disabled people after a stroke was important in the selection of physical exercise complexes, since this function determines the patient's ability to move independently. Complaints of disabled people with the consequences of a stroke, which were put forward before the experiment, about disorders of the balance function were characterized as "uncertainty", "wobbly to the side" when walking, etc. Only 14 disabled people (35.9%) completed the 5-point test, maintaining balance with feet one in front of the other; 13 patients (33.4%) could keep their balance for more than 30 seconds with their feet together.

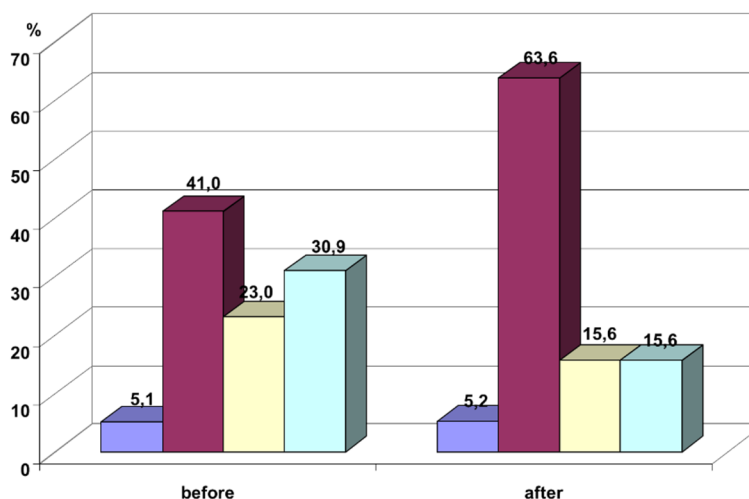


Fig. 1. Characterization of the possibilities of independent movement of disabled people with the consequences of a stroke

**Table 2
Dynamics of the duration of walking at an arbitrary pace of disabled people with the consequences of a stroke**

Result	Possibilities of free walking (min.)						
	Before 10'	Before 15'	Before 20'	Before 30'	Before 45'	Before 60'	≥ 60'
Before rehabilitation	25.7%	12.8%	10.2%	12.8%	12.8%	20.5%	5.1%
After rehabilitation	-	15.6%	-	7.7%	30.7%	30.7%	15.6%

12 people (30.7%) who used additional support when walking turned out to be unstable (3 points) in the function of maintaining balance with the feet together. Therefore, balance maintenance disorders were detected in more than half of disabled people - 25 people (64.1%). After rehabilitation, fully compensated balance function (6 points) was established in 4 persons (10.2%), in 4 disabled people (10.2%) this function remained at the previous level (3 points). In the main part of the patients, the recovery of balance up to 4-5 points should be considered as a stable compensation of the function, which provides the possibility of rational walking without the use of additional supports. After the experiment, the patients' balance function was: 3 points - 10.2%, 4 points - 43.7%, 5 points - 35.9%, 6 points - 10.2% of disabled people. The study of the force of maximum contraction of the hand of disabled people before the experiment showed a general decrease in hand dynamometry indicators in healthy limbs of men (right hand - 36.9±0.4, left hand - 38.7±0.4 kg) and women (18.4±0.7, 16.2±0.5 kg, respectively). The indicators of

maximum muscle contraction indicated a decrease in the level of physical development of disabled persons admitted to rehabilitation. The use of the proposed rehabilitation program had a positive effect on the index of hand dynamometry (the maximum result was taken on the healthy side): it increased by 24% in men, by 9% in women (p<0.05). The given data indicate an increase in general physical condition among men and women. We attached great importance to the study of the static endurance of the muscles of the shoulder girdle of disabled people on the affected and healthy side, since the use of isometric training followed by muscle relaxation in patients with high tone helps to increase it and block pathological synergies. According to the results of rehabilitation, it was established (Table 3) that there was a significant increase in the static endurance of the muscle groups of the upper shoulder girdle among men and women, while the relative increase in static endurance on the healthy side was lower (70% and 34%) than on the hemiparesis side (88% and 105%).

**Table 3
The results of tests on the static endurance of the muscles of the shoulder girdle of the disabled with stroke consequences (X±δ, p<0.05)**

Groups	Duration of static posture (min, sec)			
	Healthy side		Hemiparesis	
	Before rehabilitation	After rehabilitation	Before rehabilitation	After rehabilitation
Men (n=10)	1'31"±18"	2'22"±14"	18"±3"	34"±6"
Women (n=29)	38"±12"	51"±3"	9"±4"	19"±6"

The sample difference between the healthy and the affected side in absolute terms in units of time remained

significant (2'22" and 34" in men and 51' and 19" in women). Studies have shown that the adaptive potential of

the circulatory system of disabled people (Fig. 2) has improved after rehabilitation.

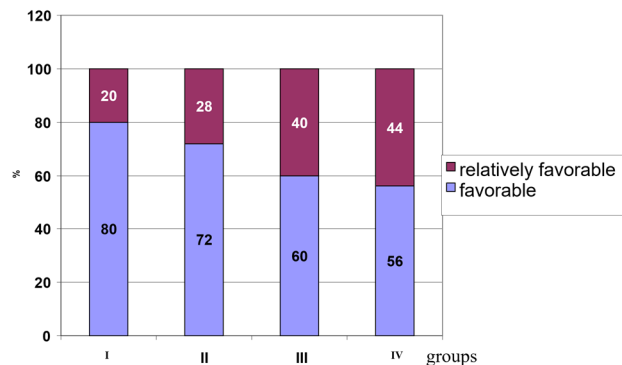


Fig. 2. The result of medical and physical rehabilitation of patients with ACC in four groups in the early recovery period.

However, in 18 disabled persons (45.0%) the level of adaptation remained unsatisfactory, in 10 patients (25.7%) the mechanism of adaptation remained in tension; 7 people (7.5%) considered the level of adaptation to be satisfactory. Thus, the morpho-functional indicators of disabled people with the consequences of a stroke improved after the rehabilitation program.

Conclusions. The assessment of the functional state of disabled people in the late period of a stroke made it possible to establish that the basis of their low motor activity lies in: walking disorders (41% of disabled people), balance functions (35.9%), a decrease in the strength and endurance indicators of muscle groups that have preserved their functionality, low level of adaptive potential of the circulatory system (56.4%), dysregulation of neuropsychological processes. The results of the experiment showed that the adaptability of disabled people with the consequences of a stroke under the influence of physical rehabilitation tools is manifested in a complex manner, a holistic reaction of the body, which was manifested by: a statistically significant ($p < 0.05$) increase in the circles of the segments of the limbs both on the healthy (up to 14%) and on the affected side (up to 8-11%); an increase in hand dynamometry indicators in men by 24%, in women by 9%; by increasing the static endurance of the shoulder girdle muscles in men by 88%, in women by 105% ($p < 0.05$) on the hemiparesis side and by 70% and 34%, respectively, on the healthy side; formation of an optimal mode of locomotion, which allows maintaining an arbitrary pace of walking for 1 hour for 46.3% of patients, 30-45 minutes - 38.4%; stable compensation of orthostatic disorders in 31 people (79.6%). The proposed rehabilitation program for disabled people who have suffered a stroke can be recommended to improve the life of patients. The results of the experiment showed that the adaptability of disabled people with the consequences of a stroke under the influence of physical rehabilitation tools is manifested in a complex manner, a holistic reaction of the body, which was manifested by: a statistically significant ($p < 0.05$) increase in the circles of the segments of the limbs both on the healthy (up to 14%) and on the affected side (up to 8-11%); an increase in hand dynamometry indicators in men by 24%, in women by 9%; by increasing the static endurance of the shoulder girdle muscles in men by 88%, in women by 105%

($p < 0.05$) on the hemiparesis side and by 70% and 34%, respectively, on the healthy side; formation of an optimal mode of locomotion, which allows maintaining an arbitrary pace of walking for 1 hour for 46.3% of patients, 30-45 minutes - 38.4%; stable compensation of orthostatic disorders in 31 people (79.6%). The proposed rehabilitation program for disabled people who have suffered a stroke can be recommended to improve the life of patients.

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ФІЗИЧНА РЕАБІЛІТАЦІЯ ІНВАЛІДІВ, ЯКІ ПЕРЕНЕСЛИ ІНСУЛЬТ (РАННІЙ ВІДНОВНИЙ ПЕРІОД)

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Резюме. Мета – підвищення ефективності програми фізичної терапії хворих із наслідками

геморагічного інсульту за допомогою диференційованого застосування реабілітаційних заходів залежно від тяжкості неврологічного розладу і супутніх захворювань у ранньому відновному періоді.

Матеріали та методи. У центрі нейрореабілітації Івано-Франківської обласної клінічної лікарні спостерігалися 100 пацієнтів, (50 чоловіків і 50 жінок, середній вік $63,57 \pm 0,43$ років) у ранньому відновному постінсультному періоді. Всі хворі були клінічно і неврологічно обстежені за спеціально розробленим протоколом відповідно до сучасних шкал – NIHSS, mRS на 10, 30, 90 і 180-й день захворювання і диференційованого лікування згідно зі стандартами та протоколами надання допомоги пацієнтам, які перенесли інсульт. Хворі були розподілені на чотири групи по 25 пацієнтів у кожній. Проведено статистичний аналіз використання методів описової статистики. Взаємозв'язок між якісними ознаками оцінювали за критерієм теста χ^2 Пірсона.

Результати. За результатами лікування серед хворих I групи 20 пацієнтів (80,0 %) (індекс mRS 0–2) мали сприятливий перебіг. У I групі відносно сприятливий результат (індекс mRS ≥ 3 бали) досягнуто лише у 5 пацієнтів (20,0 %); у II групі позитивного результату досягнуто у 17 пацієнтів (72,0 %), відносно сприятливого – у 8 (28,0 %); у III групі – сприятливий результат досягнутий у 15 пацієнтів (60,0 %), відносно сприятливий – у 10 (40,0 %), а в IV групі – сприятливий результат виявлено тільки у 14 пацієнтів (56,0 %), відносно сприятливий – в 11 (44,0 %).

Висновки. Диференційоване застосування програми реабілітації і фізичної терапії в постінсультних хворих у різних групах, із урахуванням важкості неврологічних розладів відновного періоду та підбору методів і способів лікування, призводить до значного підвищення ефективності реабілітаційних заходів.

Ключові слова: інсульт, фізична терапія, реабілітація, важкість неврологічних розладів, супутня патологія.

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