

KINESIOTHERAPY OF POST – STROKE PATIENTS DURING THE STATIONARY PERIOD OF REHABILITATION

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Summary

Improving the effectiveness of rehabilitation of patients with acute cerebrovascular accident (ACVA), based on the correction of motor disorders, normalization of muscle tone, increasing muscle strength by kinesiotherapy in the stationary period of rehabilitation.

The study included 24 patients with a diagnosis of ACVA, aged 50 to 70 years, who were in the stationary period of rehabilitation in the neurological department of Svalyava Central District Hospital, Transcarpathia. The diagnosis was established on the basis of the clinical picture, data of computer tomography, magnetic-resonance tomography, laboratory diagnostics, and anamnesis data. Patients were divided voluntarily into the main group (MG) – 12 people and the control group (CG) – 12 patients. CG patients were treated according to standard methods, as compiled on the basis of "Guidelines for rehabilitation of persons with ACVA ". Patients MG received kinesiotherapy. It includes features of the technique of kinesiotherapy for spastic hemiparesis, positional treatment, kinesiotherapy exercises for fingers and hands, kinesiotherapy exercises for the lower extremities, kinesiotherapy paralysis and the use of kinesiotherapy for vestibular syndrome. Classes in groups were conducted daily, duration 45 minutes, throughout the treatment period (3 weeks). Comparison of the effectiveness of the kinesiotherapy program in patients from MG and CG was performed using functional and neurological tests and scales, namely: testing of

muscle spasticity on the Ashford scale, manual muscle test, modified Rankin scale, Scandinavian scale, Bartell index of activity of daily life, Orgogozo test, goniometry. Statistica 7.0 applications were used for mathematical processing of numerical data and IBM SPSS Statistics 21. T – Student's criterion was used to assess the significance of the difference in the presence of the normal distribution results of study.

During studying the condition of the studied patients in the process of rehabilitation, it can be argued that in all groups there is a positive dynamics because of improves neurological and functional status of patients, because of increasing the amplitude of movements in the joints of the upper and lower extremities, reducing muscle spasticity, improving the ability to self-care, increasing mobility and independence in everyday life. These results confirm statistically better efficiency program of physical therapy, received by the patients of the main group.

Key words: stroke, physical therapy, rehabilitation, goniometry, scales

Introduction

There is a tendency of increasing of neurological diseases in Ukraine and in other countries nowadays. In the structure of neurological pathology, the most relevant and socially significant are vascular diseases of the brain, among which the leading place is occupied by acute cerebrovascular disorders [1, 2]. More than 5 million people die from strokes in the world every year [3].

Every year from 100 to 120 thousand residents of Ukraine suffer from a stroke at first time [4, 5], (more than a third of them are people of working age). 30-40% of stroke patients die within the first 30 days and up to 50% - within 1 year from the onset of the disease, 20–40% of surviving patients become dependent on outside help, and only about 10% return to full life [6].

The affections of the complex motor systems, which occur as a result of ischemic stroke, are not manifested by stereotyped motor deficit and almost always represented by a difficult and undetermined clinical structure [1, 7].

Motor disorders develop in 75% of patients in the acute period of the disease and the resistant motor defect still exist in 53% of patients, who have suffered a stroke even after six months [6].

High level of disability, which is characterized for this pathology, in most cases is associated with impairment of the motor function [1, 2, 4]. Stroke can disrupt some part of the statolocomotor system, also the significant amount of suffered from hemispheric stroke patients have a complex statolocomotor defect, which is different in nature and severity. It can not be explained by only one of the factors. It can be only the complex of factors such as: degree of hemiparesis, spasticity, sensory disorders and other disorders.

Most patients who have suffered a stroke and survive become disabled (70-80%), and 20-25% of them for the end of their lives need outside help in everyday life [1, 3, 5]. First of all, restoring the functions of movement and support, it is impossible not to use in the process of treatment the natural function of movement, inherent in the affected system. Therefore, kinesiotherapy occupies a special place in the system of treatment of motor disorders. Kinesiotherapy, as one of the leading means of physical rehabilitation, has its effect on the patient's organism using the therapeutic effect of exercise [1, 6, 7].

Therefore, the problem of physical therapy of post-stroke patients is extremely important.

Presentation of the main material of the article

The aim of the study. Improving the effectiveness of rehabilitation of patients with acute cerebrovascular accident (ACVA), based on the correction of motor disorders, normalization of muscle tone, increasing muscle strength by kinesiotherapy in the stationary stage of rehabilitation.

Materials and methods. The study included 24 patients with a diagnosis of ACVA, aged 50 to 70 years, who were in the stationary stage of rehabilitation in the neurological department of Svalyava Central District Hospital, Transcarpathia.

The diagnosis was established on the basis of the clinical picture, data of computer tomography, magnetic-resonance tomography, laboratory diagnostics, and

anamnesis data. All patients were conscious and were available for verbal contact at the time of examination. The study was conducted with the consent of patients and did not contradict generally accepted ethical standards. Patients were divided voluntarily into the main group (MG) - 12 people and the control group (CG) - 12 patients. CG patients were treated according to standard methods, as compiled on the basis of "Guidelines for rehabilitation of persons with ACVA ". Patients MG received kinesiotherapy. There was developed the intervention for the MG patients according to the individual capabilities and needs of each patient. It includes features of the technique of kinesiotherapy for spastic hemiparesis, positional treatment, kinesiotherapy exercises for fingers and hands, kinesiotherapy exercises for the lower extremities, kinesiotherapy paralysis and the use of kinesiotherapy for vestibular syndrome. Classes in groups were conducted daily, duration 45 minutes, throughout the treatment period (3 weeks). At the end rehabilitatoin, a repeated, final examination was performed for all patients in the relevant domains.

Comparison of the effectiveness of the kinesiotherapy program in patients from MG and CG was performed using functional and neurological tests and scales, namely: testing of muscle spasticity on the Ashford scale, manual muscle test, modified Rankin scale, Scandinavian scale, Bartell index of activity of daily life, Orgogozo test, goniometry. Statistica 7.0 applications were used for mathematical processing of numerical data and IBM SPSS Statistics 21. T – Student's criterion was used to assess the significance of the difference in the presence of the normal distribution results of study.

Results and discussion.

At baseline functional status of persons who have had ACVA, statistical analysis found no significant differences between patients of MG and CG, $p > 0,05$ (Table 1).

Table 1

Indicators of functional and neurological state of patients in the studied groups who have had ACVA before the rehabilitation, n=24 (M±m)

	Main group	Control group	d	t	p
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	(MG)	(CG)			
Parameter	indicator of Ashfort scale, point				
value	3.00±0.14	3.08±0.13	0.08	0.42	p>0.05
Parameter	indicator of manual-muscle test, %				
value	27.50±1.01	28.58±1.48	1.08	0.73	p>0.05
Parameter	indicator of Rankin scale, point				
value	3.75±0.14	4.00±0.19	0.25	1.04	p>0.05
Parameter	indicator of Scandinavian scale, point				
value	12.92±0.79	13.08±0.64	0.16	0.16	p>0.05
Parameter	index of test Bartella, point				
value	28.33±0.79	30.42±1.09	2.09	1.56	p>0.05
Parameter	index of test Orgogozo, point				
value	58.33±0.85	58.35±0.89	0.02	0.02	p>0.05
Parameter	indicator of goniometry (shoulder flexion), deg				
value	148.42±1.61	145.42±1.98	3.00	1.18	p>0.05
Parameter	indicator of goniometry (shoulder extension), deg				
value	40.33±1.43	40.25±1.61	0.08	0.04	p>0.05
Parameter	indicator of goniometry (adduction the shoulder joint), deg				
value	29.25±0.98	29.58±1.12	0.33	0.22	p>0.05
Parameter	indicator of goniometry (abduction the shoulder joint), deg				
value	140.42±1.40	136.92±1.36	3.5	1.79	p>0.05
Parameter	indicator of goniometry (flexion in the elbow joint), deg				
value	134.75±1.39	136.92±1.08	2.17	1.23	p>0.05
Parameter	indicator of goniometry (flexion in the hip joint during extension in the knee joint), deg				
value	77.58±1.44	75.92±1.64	1.66	0.76	p>0.05
Parameter	indicator of goniometry (flexion in the hip joint during flexion in the knee joint), deg				
value	104.75±1.75	103.08±1.07	1.67	0.81	p>0.05
Parameter	indicator of goniometry (flexion in the knee joint), deg				
value	117.33±0,83	118.76±1,41	1,43	0.87	p>0.05

Note: d – the difference between the average values; t – the value of the Student's criterion; M – the average value, p – the significance of the difference between patients with MG and CG.

A comparison of the dynamics of changes in the study between patients in the main and control groups is presented in Table 2. During studying the condition of the studied patients in the process of rehabilitation, it can be argued that in all groups there is a positive dynamics because of improves neurological and functional status of patients. Thus, we found that the indicators of the Ashfort muscle spasticity test were reduced significantly in patients of the MG of 2.08±0.26 points compared with patients in the CG of 2.66±0.13 points (p<0.05), which indicates about reducing the difficulty of movements in the extremities; the indicator of manual-muscle test

increases significantly in patients of the MG $33.99 \pm 1.98\%$ ($p < 0.01$) in contrast to patients in the CG $29.47 \pm 0.82\%$, which indicates an improvement in motor function in limbs; the value of the Rankin scale is reduced significantly in patients of the MG 2.70 ± 0.36 points ($p < 0.05$), which indicates an increase in the level of functional independence of the examined patients, while in patients of the CG the indicator decreases, but the changes are insignificant 3.65 ± 0.14 points ($p > 0.05$); the indicator of Scandinavian scale increases significantly in patients of the MG to 14.98 ± 0.37 points, in contrast to patients in the CG 13.70 ± 0.49 , who have a tendency to increase value the Scandinavian scale, which confirms the reduction of neurological deficit; the indicator of the Bartell index of activity of daily life increases significantly in patients of the MG 33.25 ± 0.43 points ($p < 0.05$), which leads to greater independence of the patient in household activities, while in patients of the CG changes in the Bartell' index unreliable 31.33 ± 0.85 points ($p > 0.05$); the indicator of Orgogozo test increased significantly in patients of the MG 63.54 ± 0.95 points ($p < 0.05$), which indicates an improvement in communication and motor functions of patients, while in patients of the CG positive changes in Orgogozo test are insignificant 60.95 ± 0.95 points ($p > 0.05$).

Table 2

Indicators of functional and neurological state of patients in the studied groups who have had ACVA after the rehabilitation, n=24 (M±m)

	Main group (MG)	Control group (CG)	d	t	P
Parameter	indicator of Ashfort scale, point				
value	2.08 ± 0.26	2.66 ± 0.13	0.58	2.15	$p < 0.05$
Parameter	indicator of manual-muscle test, %				
value	33.99 ± 1.98	29.47 ± 0.82	4.52	2.79	$p < 0.01$
Parameter	indicator of Rankin scale, point				
value	2.70 ± 0.36	3.65 ± 0.14	0.95	2.44	$p < 0.05$
Parameter	indicator of Scandinavian scale, point				
value	14.98 ± 0.37	13.70 ± 0.49	1.28	2.06	$p < 0.05$
Parameter	index of test Bartella, point				
value	33.25 ± 0.43	31.33 ± 0.85	1.92	2.13	$p < 0.05$
Parameter	index of test Orgogozo, point				
value	63.54 ± 0.95	60.95 ± 0.95	2.59	2.38	$p < 0.05$

Parameter	indicator of goniometry (shoulder flexion), deg				
value	156.73±1.34	152.12±1.78	4.61	2.07	p<0.05
Parameter	indicator of goniometry (shoulder extension), deg				
value	48.95±1.51	44.85±1.12	4.10	2.18	p<0.05
Parameter	indicator of goniometry (adduction the shoulder joint), deg				
value	35.45±1.12	32.51±0.81	2.94	2.13	p<0.05
Parameter	indicator of goniometry (abduction the shoulder joint), deg				
value	145.22±1.05	140.92±1.39	4.30	2.47	p<0.05
Parameter	indicator of goniometry (flexion in the elbow joint), deg				
value	142.92±0.98	139.85±1,05	3.07	2.13	p<0.05
Parameter	indicator of goniometry (flexion in the hip joint during extension in the knee joint), deg				
value	85.92±1.85	81.22±0.99	4.70	2.24	p<0.05
Parameter	indicator of goniometry (flexion in the hip joint during flexion in the knee joint), deg				
value	113.55±1.37	108.28±1.75	5.27	2.37	p<0.05
Parameter	indicator of goniometry (flexion in the knee joint), deg				
value	126.33±1.41	122.15±0.84	4.18	2.55	p<0.05

Note: d – the difference between the average values; t – the value of the Student's criterion; M – the average value, p – the significance of the difference between patients with MG and CG.

According to data of goniometry we observed a significant increase in the amplitude of movements in the joints of patients of the main group, while in patients of the control group the amplitude of movements increased, but the changes were insignificant, Table 2. The volume of movements increased significantly in the shoulder joint of patients of the MG with flexion from 148.42±1.61 deg to 156.73±1.34 deg, p<0.05, with extension with 40.33±1.43 deg up to 48.95±1.51 deg, p <0.05; in patients of the CG increased with flexion from 145.42±1.98 deg to 152.12±1.78 deg (p>0.05), with extension from 40.25±1.61 deg to 44.85±1.12 deg, (p> 0.05), respectively. Also, the volume of movements increased significantly in the shoulder joint both when adduction from 29.25±0.98 deg to 35.45±1.12 deg (p<0.05) and when abduction from 140.42±1.40 deg to 145.22±1.05 deg (p<0.05) in patients of the MG; in patients of the CG changes in the volume of movements in the joint during adduction (from 29.58±1.12 deg to 32.51±0.81 deg) and abduction (from 136.92±1.36 deg to 140.92±1.39 deg) were insignificant (p>0.05). The volume of movements increased significantly in the elbow joint during flexion in patients of the MG from 134.75±1.39 deg to 142.92±0.98 deg, p<0.05, in patients of the CG the amplitude of movements increased according to from 136.92±1.08 deg to

139.85±1.05 deg, $p>0.05$. The volume of movements increased significantly in the hip joint of patients of the MG when flexing the hip joint with extension knee joint from 77.58±1.44 deg to 85.92±1.85 deg, $p<0.05$, when flexing in the hip joint with flexion knee joint from 104.75±1.75 deg to 113.55±1.37 deg, $p<0.05$; in patients of the CG increased the volume of movements with flexion in the hip joint with extension knee joint from 75.92±1.64 deg to 81.22±0.99 deg, ($p>0.05$), with flexion in the hip joint with flexion knee joint from 103.08±1.07 deg to 108.28±1.75 deg, ($p>0.05$), respectively. The volume of movements in the knee joint during flexion increased significantly in patients of the MG from 117.33±0.83 deg to 126.33±1.41 deg, $p<0.05$, in patients of the CG the amplitude of movements increased according to 118.76±1.41 deg to 122.15±0.84 deg, difference of changes is insignificant ($p>0.05$).

Conclusion

Thus, the use of kinesiotherapy in the rehabilitation of patients who have suffered an acute cerebrovascular accident contributes to a significant improvement in the neurological status and functional state of the joints of investigated persons, because of increasing the amplitude of movements in the joints of the upper and lower extremities, reducing muscle spasticity, improving the ability to self-care, increasing mobility and independence in everyday life. These results confirm statistically better efficiency program of physical therapy, received by the patients of the main group.

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