Influence of Kinesitherapy on Functional Independence in Patients with Supratentorial Unilateral Stroke in Chronic Period

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Abstract

Aim: The aim of the study is to evaluate the effect of the specialized kinesitherapeutic (KT) methodology (SKTM) on functional independence in patients with supratentorial unilateral stroke in the chronic period (SUSChP). **Material and Methods:** The study was conducted with 67 patients with SUSChP (56 patients included in the experimental group - 32 men and 24 women, with duration of the disease 7.8 ± 2.0 months, and 11 patients in the control group - 9 men and 2 women, with duration of the disease 7.3 ± 1.5 months). To evaluate the changes in functional independence, test for Functional Independence Measure (FIM) was used. Patients in the experimental group were treated with a specialized 10-day KT, which later continued to be performed as an adapted exercise program at home for a period of one month. Control patients perform a regular 10-day KT. This was done using SKTM principles of modern neurorehabilitation and motor learning as opposed to usual kinesitherapy. **Results:** After applying SKTM, the highest trend towards the improvement of functional independence was established after the 1st month with a level of significance during treatment $p<0.001$. **Conclusion:** In conclusion, the enclosed SKTM in the experimental group continued later as an adapted exercise program at home. It significantly improves the functional independence in patients with supratentorial unilateral stroke in the chronic period (SUSChP) compared

with the usual kinesitherapeutic methodology applied in the control group.

Keywords: Kinesitherapy, Functional independence, Stroke, Chronic period

Introduction

Motor damage after stroke usually affects the control of the movement of upper and lower limb on one side of the body (Warlow, et al., 2008). Hence, this is observed in about 80% of patients. Almost two-thirds of people with stroke have initial mobility deficiencies (Jørgensen, et al., 1995; Shaughnessy, et al., 2005) and six months after the stroke, more than 30% of the survivors still cannot walk alone (Jørgensen, et al., 1995; Mayo, et al., 2002; Patel, et al., 2000). Therefore, much of the focus of poststroke kinesitherapy, in particular the therapists' work, is aimed at restoring physical independence, and often the ultimate goal of treatment is to improve gait and restore balance (Pollock, et al., 2014).

Functional independence is the ability to perform day-to-day activities without help. Achieving it gives unlimited participation to sick people in activities that matters to them. Whether there is physical disability, participation in daily life activities and the performance of various activities, it is quite important for the health and welfare of the patients (Baum, 2003; WHO, 2001).

Persons who were able to carry out daily activities achieve greater personal satisfaction and quality of life, more energy, fewer organic diseases, less pain, and better physical fitness (Larson, et al., 2003). All this ultimately reduces the cost of their treatment.

The goal of all kinesitherapeutic programs in stroke is to maximize the restoration of the functional independence of patients (Dittmar, 1997). Regardless of the stage of the illness, the members of the rehabilitation team are focused on preserving or improving the functional capacity to carry out daily activities tailored towards the individual abilities of each patient. Due to the subjective assessment, it is important to define a family care plan or framework for patient-centered care. This framework defines a set of ideas, attitudes, and approaches towards care for patients with special needs and their families (Edelman, 1991). It relates to the relationship between the sick, their families and health workers based on the priorities of the patients and their families, and it is in line with their shared goals (Breske, 1992).

Some key elements of care for the patient and his / her family entails the importance of the family, adherence to the different coping methods, family support and professional cooperation at all levels of the health system as well as controlled sharing of complete and impartial information with families, and providing appropriate support.

By applying this frame of reference in practice, the therapeutic team will be able to plan the treatment process so that it will be consistent with the patient's goals and priorities. Neurorehabilitation programs, which thus focus on planned activities, are more likely to achieve the desired results in terms of promoting active lifestyles, effective recovery, and reducing the workload of patients with physical disability for a long period of time (Fisher, 1992; Jonson, et al., 1998; Robertson & Colborn, 1997).

A number of systemic studies have shown that the factors for restoring the ability to walk and carry out daily activities are related to improving functional independence (Kwakkel, et al., 1996; Mejer, et al., 2003; Dombovy, et al., 1986; Jongbloed, 1986; Counsell & Dennis, 2001). The importance of these studies is illustrated by the fact that more than a hundred studies have been published since 1950 (Kwakkel, et al., 1996; Kwakkel,1998; Dombovy, et al., 1986; Jongbloed, 1986; Shan, et al., 1990; Feigenson, 1979; Gresham, 1990).

Despite some methodological weaknesses, the analysis of 78 prospective studies showed a tendency to predict functional independence and improve day-to-day activities after stroke (Kwakkel, et al., 1996; Wade & Hawer, 1987; Taub, et al., 1994; Motto, et al., 1999; Thommessen, et al., 1999; Wyller, et al., 1997; Sveen, et al., 1996). An important factor is the ability to perform everyday activities immediately after the stroke reported by the Barthel index during the first 2 weeks. Other authors believe that improving day-to-day activities, overcoming heart failure and consciousness, are the most important factors in the first year after stroke this year playing a long-term role (Counsell & Dennis, 2001; Kwakkel, et al., 1996; Dombovy, et al., 1986; Jongbloed, 1986).

Important independent factors in functional independence in performing day-to-day activities are: (1) initial independence in performing daily activities as measured by Barthel Index; (2) urinary incontinence; (3) the level of consciousness within the first 24 hours of stroke; (4) the duration of the disease; (5) the recurrent stroke status; (6) the weight of the parentage; (7) the possibility of maintaining a sitting equilibrium when the patient is admitted; (8) orientation in time and space; (9) the availability of social and family support; (10) the presence of heart failure; (11) the presence of depression (Kwakkel, et al., 1996; Mejer, et al., 2003; Counsell & Dennis, 2001, Kauhanen, et al., 1999; Kotila, et al., 1998).

There is no clear link between the affected side of the body, gender, and ethnicity (Kwakkel, et al., 1996; Jongbloed, 1986).

Functional independence after stroke depends on numerous and lesser hierarchical factors in the recovery of personal care. According to Katz's index, eating and drinking are the first skills that recover up to 80% in patients with stroke. This is followed by walking in the toilet, undressing,

and dressing. The most difficult is to restore the bathing skills (Wade & Hawer, 1987; Katz, et al., 1966; Ebrahim, et al., 1985).

The results of longitudinal studies show that most of the restoration of functional independence is in the first 3 months of the onset of the disease. Other studies have shown that improvements are most striking after the 6th month of stroke. A small number of studies have shown that after 6 months, 10-15% of patients may improve or worsen the condition (Kwakkel, et al., 2000).

Lubenova, et al. (2008) prove that as a result of the coordination exercises such as slow movement, retention in a certain phase, targeting, coordinating samples, Kabat diagonals with coordination and applied direction, a positive result is achieved in the functional independence of patients with an ischemic stroke in the underlying hemisphere (Lubenova, et al., 2008).

Material and Methods

The research includes a study of 67 patients with SUSChP (56 patients included in the experimental group - 32 men and 24 women, with duration of disease 7.8 ± 2.0 months, and 11 patients in the control group - 9 men and 2 women, with duration of disease 7.3 ± 1.5 months).

The clinical characteristics of the patients are given in Table 1. To determine the severity of the paresis, a modified scale Chedoke-McMaster was used. Here, patients with the 4th and 5th stages are with moderate disease, while patients of 6th and 7th stage have mild impairment (Cowland, et al., 1993; Wade, 1992). On this basis, the patients are divided into two subgroups (moderate and mild impairment).

The existence of homogeneity in the study did not include patients with acute stroke and brain hemorrhage spent, as well as with the case of bilateral or severe paresis. After the selection, some other patients were additionally excluded from the study: patients who have refused to participate in the study for various reasons (greater distance they need to travel, business and family commitments) and those which were prescribed a change of drug therapy during the applied treatment. Therefore, all patients were able to move independently or with assistance without serious problems in communication and previously prescribed medication therapy by neurologists, including antiplatelet and antihypertensive drugs.

Table 1. Clinical characteristics of contingent baseline

Parameters	Patients	Moderate degree	Mild degree
Experimental group	**n=56**	**n=33**	**n=23**
Age	63.2±8.8	63.9±7.1	62.3±10.9
Sex (men / women)	32/24	22/11	10/13
Limitation periods (months)	7.8±2.0	8.3±2.2	7.2±1.5
Localization (left / right)	26/30	16/17	10/13
Control group	**n=11**	**n=5**	**n=6**
Age	63.3±6.0	63.6±5.3	63.1±7.1
Sex (men / women)	9/2	5/0	4/2
Limitation periods (months)	7.3±1.5	7.6±1.8	7.0±1.2
Localization (left / right)	5/6	2/3	3/3

$\bar{X}$±SD - mean and standard deviation EG - the experimental group, KG - control group. The significance of the intra-group changes is defined by the binominal test. Intergroup significance of sex and localization is determined by U-criteria of Mann Whitney for independent samples, while for age and limitation period, a Student t-test for independent samples is attached.

To evaluate the changes in functional independence, Functional Independence Measure (FIM) test was used. Patients from the experimental group were treated with a specialized 10-day KT, which was later performed as an adapted home exercise program for a period of 1 month. Control patients perform a regular 10-day KT.

Methods of Kinesitherapy

The experimental group comprised of 56 patients (32 men and 24 women) with duration of disease 7.8±2.0 months who received a specialized kinesitherapeutic methodology (SKTM) for 10 days, and then continue at home as adjusted program of exercises over a period of 3 weeks (Vasileva & Lubenova, 2014).

The control group (CG) consisted of 11 patients (9 men and 2 women) with duration of the disease 7.3±1.5 months treated in a routine manner by a conventional 10-day kinesitherapeutic methodology. Thus, they held only trace control without continuing the kinesitherapeutic program after the first 10 days of treatment.

The two applied kinesitherapeutical methods are different in their duration of treatment, structure, and incorporated applied kinesitherapy (postural movements, walking, active movements of the upper limbs and transfers). SKTM principles of modern neurorehabilitation and motor learning are opposed to usual kinesitherapy.

It is based on the fundamental principles of modern neurorehabilitation, namely: to be individualized, intensive and specifically -

tailored and focused on the individual needs of the patient; be realized with the active participation of the patient and his family, with prolonged use so as to ensure that care is tailored to the needs of the patient throughout his life in order to achieve recovery and relief of late complications of the disease (Lubenova & Titianova, 2015).

Specialized kinesitherapeutic methodology conforms to the principles of motor learning. They are: specificity of the task, active participation of the patient repetition adaptation of complexity, feedback variability "contextual interference" (Krakauer, 2006).

In the introductory part, the exercises were aimed to prepare the body for the upcoming exercises, gradual adaptation of the cardiovascular system (chest and diaphragmatic breathing). The main part of KT include therapeutic exercises for the transition from the occipital lying to standing, exercises for upper limb and control of the shoulder girdle, lower limb exercises and control of the trunk, pelvis and walking. The final part includes relaxation exercises to patients. After the 10-day daily physical therapy, patients adapt program for home rehabilitation for three months (Vasileva & Lubenova, 2014).

Statistics

A lot of statistical programs were used for quantitative processing of data received. However, variation (Student-Fisher t-test) and alternative and correlation analysis was used for objectifying the changes of the applied treatment.

When comparing the non-parametric parameters in the course of treatment, Wilcoxon test was used to determine the significance of differences between groups given as U-criterion of Mann-Whitney. Paired Samples t-Test was applied to compare the parametric performance. In addition, an alternative analysis is used to determine the significance in the percentage of patients.

The correlation analysis Spearman is used to search for a link between changes in various indicators.

Results

The results of the study in patients with SUSChP prior to treatment and after the applied kinesitherapy are summarized in Table 2. The differences between the derived and baseline values as well as the significance of the changes between the two study groups are presented in Figure 1.

There was a significant improvement in the functional independence, according to the total number of points in the FIM test. The change is significant and most notable at the 1st month (122.4 points), with a

maximum number of 126 points. These positive changes are mainly related to improved personal care, relocation, and movement of the patients after the 10th day of treatment. There remains a slight end-of-treatment deficit in some patients related to the need for monitoring when performing the above-mentioned daily activities.

Table 2. Changes in the functional independence of the experimental and the control group during the course of treatment (in points)

Parameters	Groups	At the beginning EG (n=56) CG (n=11)	10th day EG (n=56) CG (n=11)	1st month EG (n=56) CG (n=11)
Personal care activities (6 activities).	EG	30,59± 8,05	38,86± 4,14***	41,04± 1,57***
	CG	32,73± 5,14	37,27± 2,97***	35,00± 4,10**
	P	0,402	0,233	**0,000**
Movement (3 activities).	EG	12,93±4,12	18,43±2,40***	19,71±1,28***
	CG	14,00±2,93	16,73±2,41***	15,64±2,34**
	P	0,415	**0,035**	**0,000**
Transfer (2 activities)	EG	9,86±3,31	12,71±1,64***	13,45±0,76***
	CG	10,18±2,36	12,27±1,19**	11,27±1,56*
	p	0,758	0,399	**0,000**
Communication (2 activities)	EG	13,07±1,80	13,57±0,89**	13,61±0,85**
	CG	13,00±1,18	13,45±0,82	13,09±1,14
	P	0,900	0,689	0,086
Social activity (3 activities)	EG	18,79±2,61	20,59±1,11***	20,63±1,00***
	CG	18,73±2,00	19,82±1,66*	19,09±1,92
	P	0,944	0,058	**0,000**
Total number of points	EG	99.2±18	118.2±9 ***	122.4±4.5 ***
	CG	102.6±11.7	113.5±7.7 *	108.1±9.6
	P	0.551	0.119	**0.000**

$\bar{X}$ ±SD – mean and standard deviation, *** p<0.001, ** p<0.01, * p<0.05 - significant change compared to baseline in the course of treatment assessed by Wilcoxon Test; P<0.001 - significance of the change between the two groups as measured by U-criteria of Mann-Whitney Test.

In control patients, the reduction in the number of scores for the 108.1 functional independence scores was observed in the 1-month follow-up of treatment initiation. The persistence of movement and personal effects were established at 1 month of treatment initiation.

Significant differences between the groups (p <0.001) in the 1st month for all categories and for the total number of points were associated

with the opposite trend of the changes in the two groups, most especially emphasized at the end of the monitored period.

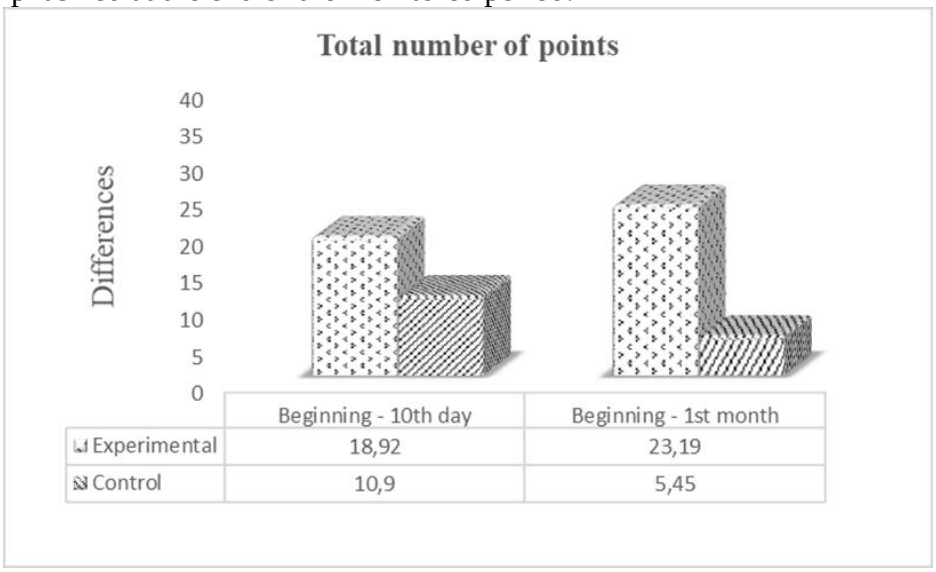

Figure 1. Changes in the total number of points functional independence, according to the scale of FIM, represented as the difference between the results obtained and output values of the two groups studied; *** P <0.001 - significance of the change between the two groups as measured by U-criteria of Mann-Whitney Test.

An assessment of the effect of SKTM, depending on the severity of the disease, established a significant correlation between the severity of the disease and functional independence.

Furthermore, we followed changes in mild and moderate severity of stroke during treatment (Table 3).

Early treatment revealed significant differences in the mean values of mild and moderate patients for all follow-up test movements. After 10 days of treatment, this significance between the two subgroups remained. This is despite the significant improvement in patients with moderate severity of involvement in all follow-up activities. This result is explained by the fact that patients who are in a worse functional condition are more marked than those with a slight severity. Here, the change is less, probably because of the higher baseline data.

At the 1st month, for most of the tracked indicators, there are no significant differences between the two subgroups that we associate with the use of SKTM in the experimental group and its essential importance for reducing or eliminating the differences at the end of the study.

Table 3. Changes in functional independence in the experimental group, depending on the severity of the damage (in points)

Parameters	Groups / subgroups	At the beginning moderate (n=33) mild (n=23) $\bar{X}\pm S_D$	10th day moderate (n=33) лека (n=23) $\bar{X}\pm S_D$	1st month moderate (n=33) лека (n=23) $\bar{X}\pm S_D$
Personal care activities	moderate	5.3±1.3	6.8±0.4 *	6.9±0.2 *
Eating (FIM 1.1)	mild	6.4±0.9	6.9±0.2	6.9±0.2
	P	0.002	0.127	0.781
Hygiene - tooth care, hair	moderate	4.8±1.2	6.6±0.7	6.9±0.2 ***
removal, hand and face wash,	mild	6.7±0.4	***	6.9±0.2 *
make-up; shaving (FIM 1.2)	P	0.000	6.9±0.2 *	0.781
	moderate	3.2±1.4	0.016	6.2±1.0 ***
Bathing (FIM 1.3)	mild	5.1±0.4	5.2±1.3	6.9±0.2 ***
	P	0.000	***	0.001
	moderate	4.3±1.2	6.9±0.2	6.9±0.2 ***
Dressing / undressing from the	mild	6.1±0.9	***	6.9±0.2 **
waist up (FIM 1.4)	P	0.000	0.000	0.781
	moderate	4.1±1.3	6.1±0.8	6.8±0.4 ***
Dressing / undressing from the	mild	6.1±0.9	***	6.9±0.2
waist down (FIM 1.5)	P	0.000	6.9±0.2	0.127
	moderate	4.4±1.5	**	6.7±0.4 ***
Toilet (FIM 1.6)	mild	6.1±0.9	0.000	6.9±0.2 **
	P	0.000	5.8±0.9	0.017
	moderate	3.9±1.3	***	6.9±0.2 ***
Movement	mild	5.7±1.0	6.9±0.2	6.9±0.2 **
From bed of chair / wheelchair; or	P	0.000	0.000	0.781
standing up when walking (FIM	moderate	4.4±1.5	6.2±0.9	6.7±0.5 ***
3.1)	mild	6.1±0.9	***	6.9±0.2
Go to a toilet, incl. sitting and	P	0.000	6.9±0.2	0.017
getting up (FIM 3.2)	moderate	2.5±0.9	**	5.5±0.9 ***
	mild	4.0±1.3	0.000	6.7±0.5 ***
Go to the bathtub or shower, incl.	P	0.000	6.4±0.7	0.000
entry and exit (FIM 3.3)	moderate	4.5±1.4	***	6.8±0.3 ***
Transfer	mild	6.5±0.5	6.9±0.2	6.9±0.2 *
Walking or moving with a	P	0.000	**	0.005
wheelchair (FIM 4.1)	moderate	3.5±1.5	0.002	6.3±0.5 ***
	mild	5.8±1.1	6.2±0.9	6.9±0.2 ***
Ascent / descent of stairs - 12-14	P	0.000	***	0.000
feet (FIM 4.2)	moderate	6.4±1.0	6.9±0.2	6.8±0.4 **
	mild	6.9±0.2	0.000	6.9±0.2
Communication	P	0.014	4.5±1.1	0.127
Understanding hearing and visual	moderate	6.1±1.3	***	6.6±0.8 **
signals (FIM 5.1)	mild	6.9±0.2	6.3±0.9	6.9±0.2
Expression - verbal and nonverbal	P	0.004	***	0.016
(FIM 5.2)	moderate	5.8±0.9	0.000	6.8±0.3 ***
	mild	6.5±0.8	6.4±0.7	6.9±0.2 *

	P	0.002	***	0.127
Social activity	moderate	5.8±0.9	6.9±0.3 *	6.8±0.4 ***
Social interaction (FIM 6.1)	mild	6.9±0.3	0.000	6.9±0.2
	P	0.000	5.5±1.1	0.127
Solving problems, incl. of	moderate	6.0±1.1	***	6.8±0.4 ***
everyday life (FIM 6.2)	mild	6.9±0.3	6.8±0.6 *	6.9±0.2
	P	0.000	0.000	0.127
Memory - relative skills of			6.7±0.4	
everyday life (FIM 6.3)			**	
			6.9±0.2	
			0.048	
			6.6±0.8	
			**	
			6.9±0.2	
			0.016	
			6.8±0.4	
			***	
			6.9±0.2 *	
			0.127	
			6.8±0.4	
			***	
			6.9±0.2	
			0.127	
			6.7±0.5	
			***	
			6.9±0.2	
			0.121	
Total points of FIM	moderate	89.4±16.2	113.7±9.0	120.7±4.3***
	mild	113.3±8.8	***	124.9±3.3***
	P	0.000	124.5±3.8	0.000
			***	
			0.000	

$\bar{X}$±SD – mean and standard deviation, *** p<0.001, ** p<0.01, * p<0.05 significant change compared to baseline in the course of treatment assessed by Wilcoxon Test; P <0.001, P <0.01, P <0.05 – significance of the change between the two groups as measured by U-criteria of Mann-Whitney Test.

Table 4. Changes in functional independence in the control group, depending on the severity of damage (in points)

Parameters	Groups / subgroups	At the beginning moderate (n=5) mild (n=6) $\bar{X}$±S_D	10th day moderate (n=5) mild (n=6) $\bar{X}$±S_D	1st month moderate (n=5) mild (n=6) $\bar{X}$±S_D
Personal care activities	moderate	6.0±0.7	6.8±0.4	6.6±0.5

Eating (FIM 1.1)	mild	6.3±0.8	6.6±0.5	6.5±0.5
	P	0.537	0.792	0.792
Hygiene - tooth care, hair removal,	moderate	5.2±0.4	6.2±0.4 *	5.6±0.9
hand and face wash, make-up; shaving	mild	6.3±0.8	6.8±0.4	6.5±0.8
(FIM 1.2)	P	0.052	0.082	0.177
	moderate	3.2±1.1	4.4±1.3	4.0±1.2
Bathing (FIM 1.3)	mild	5.2±0.7	6.0±0.6 *	5.5±1.1
	P	0.017	0.052	0.082
	moderate	4.8±0.4	5.8±0.4 *	5.4±0.7
Dressing / undressing from the waist	mild	6.0±0.8	6.5±0.5	6.0±0.9
up (FIM 1.4)	P	0.052	0.126	0.429
	moderate	4.6±0.5	6.0±0.2 *	5.4±0.5
Dressing / undressing from the waist	mild	6.0±0.9	6.5±0.5	6.0±0.9
down (FIM 1.5)	P	0.030	0.177	0.329
	moderate	5.0±1.2	6.0±0.7	5.8±0.4
Toilet (FIM 1.6)	mild	6.2±0.7	6.5±0.5	6.3±0.5
	P	0.082	0.329	0.247
	moderate	4.2±0.8	5.4±0.5	5.2±0.8
Movement	mild	5.5±0.5	6.3±0.5 *	5.8±0.7
From bed of chair / wheelchair; or	P	0.030	0.052	0.329
standing up when walking (FIM 3.1)	moderate	5.0±1.2	5.8±0.4	5.8±0.4
Go to a toilet, incl. sitting and getting	mild	6.0±0.8	6.5±0.5	6.2±0.7
up (FIM 3.2)	P	0.177	0.136	0.429
	moderate	2.6±0.5	3.6±0.8	3.2±0.8
Go to the bathtub or shower, incl.	mild	4.3±1.2	5.5±1.1 *	4.8±1.3
entry and exit (FIM 3.3)	P	0.052	0.017	0.052
	moderate	4.8±0.8	6.4±0.5 *	5.8±0.8
Transfer	mild	6.3±0.5	6.8±0.4	6.5±0.5
Walking or moving with a wheelchair	P	0.017	0.247	0.177
(FIM 4.1)	moderate	3.6±1.5	5.0±1.2 *	4.4±1.5
	mild	5.3±0.5	6.1±0.4 *	5.6±0.8
Ascent / descent of stairs - 12-14 feet	P	0.052	0.082	0.177
(FIM 4.2)	moderate	6.6±0.5	6.8±0.4	6.6±0.5
	mild	6.7±0.5	6.8±0.4	6.6±0.5
	P	0.931	0.931	0.931
Communication	moderate	6.0±1.2	6.4±0.5	6.2±0.8
Understanding hearing and visual	mild	6.6±0.5	6.8±0.4	6.6±0.5
signals (FIM 5.1)	P	0.329	0.247	0.429
Expression - verbal and nonverbal	moderate	5.8±0.8	6.2±0.8	6.0±1.2
(FIM 5.2)	mild	6.5±0.5	6.8±0.4	6.5±0.5
	P	0.177	0.247	0.429
	moderate	6.0±0.7	6.4±0.5	6.4±0.5
Social activity	mild	6.5±0.5	6.8±0.4	6.5±0.5
Social interaction (FIM 6.1)	P	0.329	0.247	0.792
	moderate	6.0±0.7	6.4±0.5	6.2±0.8
Solving problems, incl. of everyday	mild	6.5±0.5	6.8±0.4	6.5±0.5
life (FIM 6.2)	P	0.329	0.247	0.662
Memory - relative skills of everyday life (FIM 6.3)				

Total points of FIM	moderate	93.4±7.8	107.6±5.5	102.6±8.2
	mild	110.3±8.3	*	112.6±8.6
	P	0.030	118.5±5.5	0.082
			*	
			0.030	

X±SD mean and standard deviation, * p<0.05 – significant change compared to baseline in the course of treatment assessed by Wilcoxon Test; P <0.05 – significance of the change between the two groups as measured by U-criteria of Mann-Whitney Test.

Specialized kinesitherapy has a significant effect on the total points score in both groups. In the case of ill patients, a significant effect is found in 50% of the activities. This effect is retained during the 1st month.

Furthermore, the control group experienced a similar trend at the start of treatment (Table 4). On the 10th day of normal kinesitherapy, only some day-to-day activities were affected. There were also no significant differences between the two subgroups at month 1. Also, there was also no baseline versus treatment baseline values for mild and moderate severity of stroke. This, however, means that the effect of the applied therapy had no prolonged effect after its completion in both subgroups.

Conclusion

The presented results show that the applied experimental methodology permanently improves the activities related to personal care, movement, relocation, communication, and social activity. This was as opposed to the control methodology which is confirmed by the significant differences between the two groups in 50% of the follow up activities at the end of the treatment.

Furthermore, this lasting positive effect in the experimental group can be related to various mechanisms where the targeted movements affect the functional capabilities of patients with stroke in a chronic period. These basically include: functional upper and lower limb movements, body and pelvic control that normalize the control of the body's intact and affected parts as well as the motor response sequence. It is essential to include walking instruction in the methodology, which leads to normalization of the lower limb control and facilitates the movement (Vasileva, et al., 2015; Vasileva, et al., 2015; Lubenova, et al., 2008; Vasileva, et al., 2017).

An improvement on the 10th day from the onset of treatment in both groups is probably due to the fact that the applied methodologies are moderate in intensity and are individually tailored to the patient's abilities.

The beneficial effect on the patients in the experimental group remains significant in one month follow-up. This therefore necessitates the need for prolonged kinesitherapeutic use - at least 4 weeks and appropriate

individual training. Training in new methods, with the necessary length of time, changes the brain and creates a new motor stereotype (Lubenova, et al., 2015).

Improved locomotor activity in the experimental group on the 10th day in a hospital setting under the control of a therapist is maintained in the middle of life. Also, this has been linked to the positive influence of the surrounding and psychosocial factors relevant to the performance of motor tasks. Obviously, these factors in the home environment are favorable and they provide an opportunity to generalize the acquired skills (Dijoseph, 1982; Iwarsson & Isacsson, 1997).

Similar results are reported by other authors who have found that improving daily life activities and overcoming heart failure and consciousness are important factors in the first year after stroke. This year plays a significant role in the long run (Counsell & Dennis, 2001; Kwakkel, et al., 1996; Dombovy, et al., 1986; Jongbloed, 1986).

Kr. Grigorova-Petrova (2015) confirms that duration is essential for the recovery of patients with stroke in an acute period. It proves the positive effect of a 4-week kinesitherapeutic program, including in-work training with inspecting device, bedding, sitting, walking, and walking in patients with ischemic stroke in an acute period. The author demonstrates the positive effect of the applied kinesitherapeutic agents in an acute period after ischemic stroke and the need for continuation of kinesitherapy in achieving patient's independence in everyday life, which was reported for most of the follow-up activities of the FIM test in this study (Grigorova-Petrova, 2015).

Differences in mild and moderate changes can be explained by the fact that functional recovery implies more than restitution of body functions. In particular, recent studies exploring human kinematics show that improving fine movements and gait is largely dependent on the use of compensatory motion strategies to help patients to learn how to cope with the existing neurological deficit (Kwakkel, et al., 2004).

The application of specialized kinesitherapy has beneficial effects on functional motor abilities of patients with stroke in chronic period. The effect is positive and lasts until the end of the intervention period in the experimental group (Indredavik, et al., 1998; O'Sullivan, 2007; Pollock, et al., 2014).

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