EFFECTIVENESS OF PHYSIOTHERAPY IN ACUTE PHASE OF STROKE

TARASOVÁ M., BÁRTLOVÁ B., NOSAVCOVOVÁ E., AL FADHLI A. K., POSPÍŠIL P., KONEČNÝ L., POHANKA M., FIŠER B., DOBŠÁK P., SIEGELOVÁ J.

Department of Physiotherapy and Rehabilitation, Department of Functional Diagnostics and Rehabilitation, Faculty of Medicine, Masaryk University, St. Anne's Faculty Hospital, Brno, Czech Republic

A b s t r a c t

The aim of the study was an analysis of the functional state of patients by means of test scales in a set of patients after acute stroke with moderate and light disablement in the course of hospitalisation at 1st Department of Neurology of the Masaryk University Faculty of Medicine with intensive rehabilitation treatment.

Ninety-six patients were examined before and after complete rehabilitation, and the measure of functional disablement, functional disorder, and quality of life were tested. The results proved that a complex therapy along with intensive rehabilitation led in patients after stroke in the acute phase to an improvement of their functional state and reduction of the measure of impairment of motor and cognitive functions; the differences were statistically significant.

K e y   w o r d s

Stroke, Impairment of function, Rehabilitation

INTRODUCTION

Optimal rehabilitation of stroke is based on the analysis of factors influencing the rehabilitation potential of the patient. These factors include the extent of disablement, other diseases, the level of cognitive functions, limitation of daily life activities, barriers in the neighbourhood, and social integration. Several tests are used for quantification of the monitored parameters (*1–5*).

Testing the condition of the patients before and after the treatment is a necessary part of determination of medical treatment and evaluation of the effect of physiotherapy. It enables us to compare the successfulness of various medical treatments and the quality of clinical workplaces by means of an objective evaluation. Testing by means of special scales and tests made or suitable for the given group of patients gives evidence of the measure of functional disablement and enables us to determine:

- functional potential of the patient;
- functional prognosis;
- treatment efficacy.

It objectifies the condition of the patient and enables statistical evaluation and comparison of the effect of therapy. It also shows the actual range of disablement in comparison with the diagnosis made.

Stroke is a serious disease. The quality of life in stroke is given not only by local neurological symptoms, such as motor and sensory deficits of neurological functions and aphasia, but also by the presence of negativity, depression, fatigue, vascular dementia, and frequent falls with injuries and bone fractures (2). Testing the condition of the patients after stroke in acute rehabilitation is necessary for evaluation of the process of the whole disease and for verification of both medication therapy and complete rehabilitation.

AIM

The aim of the study was the analysis of affection of the functional state of the patients after stroke with moderate and light disablement before and after intensive rehabilitation treatment.

METHODOLOGY

The group consisted of 96 patients of an average age of 62.1 ± 12.0 years (range 30–91 years) with the diagnosis I 60 – I 69 (generally impairment of central nervous system, CNS, with motor disorder) with moderate and light affection of motor and cognitive functions, evaluated according to the measure of functional disablement (Functional Independence Measure, FIM, 6, 7, 8), who were hospitalised after an acute attack of stroke at the 1st Dept. of Neurology of St. Anne's Faculty Hospital in Brno. The group comprised 36 women of an average age of 61.6 ± 13.4 years (range 30–83 years) and 60 men of an average age of 62.5 ± 11.3 years (range 34–91 years). The age distribution of the monitored group is in *Fig. 1.*

Table 1
Lateralisation of the disease

Lateralisation of the disease	
Symptoms	Number
right-hand side hemiparesis	39
left-hand side hemiparesis	35
VB territory (CVS, cerebellum sy)	22

VB territory – territory of arteria vertebrobasilaris, CVS – central vestibular syndrome
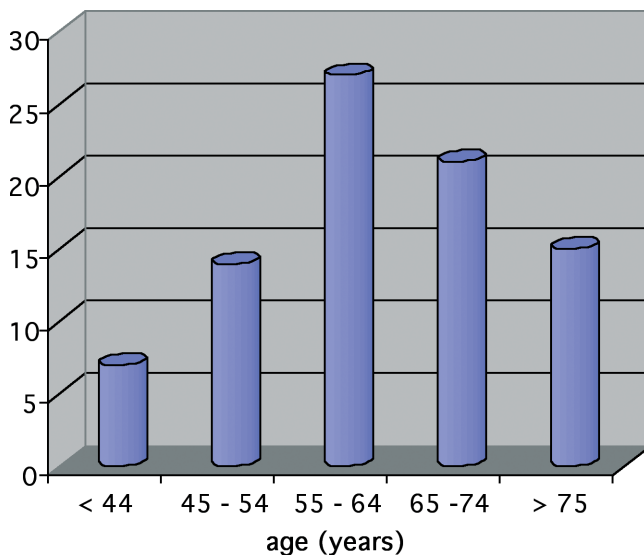
Fig 1
Age distribution of patients with stroke

The average duration of hospitalisation was 14.2 ± 7.5 days (minimum 3 days and maximum 42 days); 78 patients were discharged from hospital for home care, 18 patients were referred to a long-term care hospital. The territory of "arteria carotis interna sinistra" was the most often affected arterial territory in this group. The lateralisation of the disease is shown in *Table 1.*

The following test scales were used for evaluation of the disablement measure and possibilities of monitoring (*9, 10, 11, 12*):

We used the following for evaluation of activity (disability):
    The questionnaire Functional Independence Measure (FIM)
    Barthel test (BI) – assessing independence

We used the following for measurement of impairment:
    Mini-mental state examination according to Folstein (MMSE) – evaluation of cognitive functions and mental conditions was used for measurement of impairment.
    For the evaluation of the general condition and walking of patients with stroke we used the test according to the Chedoke-McMaster Rehabilitation Centre, Canada (CH).

We used the following for evaluation of the quality of life:

Index of quality of life – short version of SF 36 – Index of quality of life Short Form (SF 36) was used.

The tests ware carried out on the first day of rehabilitation (entry) and then at discharging from the Dept. of Neurology (exit).

METHODS

Rehabilitation treatment in our department was carried out on the basis of the prescription and the contents of the exercise unit, choice of exercises, and methodologies. The application of a therapeutic exercise is a process which demands an initial examination of the patients' needs and is based on kinesiological analysis, functional examination of independence, and current condition of the patient. The intensity was, as necessary, 1–2x daily individual exercises on at least 5 days in a week with the application of facilitation elements and methods; the patients were also provided with logopaedic and psychological care.

The study was approved by the local ethical committee and the patients signed their informed consent. The results are presented as average ± standard deviation. For statistical evaluation the Wilcoxon test for paired values was used.

RESULTS

We present the results of the functional state of stroke patients at neurophysiotherapeutic treatments acquired by means of test scales. The examinations were made at the beginning of rehabilitation and at discharging from the neurological department. The results are presented in the form of tables.

Evaluation of activity (disability):

Table 2

Evaluation of functional state by means of FIM in patients with stroke in acute phase

characteristics of the group	FIM entry x ± SD	FIM exit x ± SD	difference exit-entry	statistical significance
whole group (n = 96)	98.2 ± 15.7	110.9 ± 13.5	12.7	p< 0.01
group of women (n = 36)	99.8 ± 16.8	112.8 ± 11.8	13	p< 0.01
group of men (n=60)	98.0 ± 15.0	109.8 ± 11.7	11.8	p< 0.01

n – number of patients, SD – standard deviation, x – average, p< 0.001 – level of statistical significance; FIM – functional independence measure

Table 3

Evaluation of functional state by means of BI in patients with stroke in acute phase

characteristics of the group	BI entry x ± SD	BI exit x ± SD	difference exit-entry	statistical significance
whole group (n = 96)	78.2 ± 16.7	94.5 ± 8.6	16.3	p< 0.001
group of women (n = 36)	76.9 ± 17.5	93.5 ± 9.5	16.6	p< 0.001
group of men (n=60)	78.9 ± 16.4	95.0 ± 7.9	16.1	p< 0.001

n – number of patients, SD – standard deviation, x – average, p< 0.001 – level of statistical significance; BI – Barthel index

Evaluation of impairment:

Table 4

Evaluation of functional state by means of MMSE in patients with stroke in acute phase

characteristics of the group	MMSE entry x ± SD	MMSE exit x ± SD	difference exit-entry	statistical significance
whole group (n = 96)	25.2 ± 4.7	28.0 ± 2.6	2.8	p< 0.001
group of women (n = 36)	25.3 ± 4.8	28.2 ± 2.5	2.9	p< 0.001
group of men (n=60)	25.1 ± 4.7	27.8 ± 3.0	2.7	p< 0.001

n – number of patients, SD – standard deviation, x – average, p< 0.001 – level of statistical significance; MMSE – Mini-mental State Examination

Table 5

Evaluation of functional state by means of CH in patients with stroke in acute phase

characteristics of the group	CH entry x ± SD	CH exit x ± SD	difference exit-entry	statistical significance
whole group (n = 96)	79.8 ± 16.2	92.0 ± 11.6	12.2	p< 0.001
group of women (n = 36)	79.1 ± 17.5	91.5 ± 12.4	12.4	p< 0.001
group of men (n=60)	80.2 ± 15.5	92.4 ± 11.1	12.2	p< 0.001

n – number of patients, SD – standard deviation, x – average, p< 0.001 – level of statistical significance; CH – test: Chedoke-McMaster Rehabilitation Centre

Evaluation of quality of life:

The numerical formulation of life quality dimensions, i.e. individual dimensions influencing the quality of life, is based on the questionnaire SF-36 and is calculated as mean values of the specific questions from the questionnaire structured in a particular way. These dimensions attain values from 0 to 100. A lower value generally means a worse value of the given dimension and decreases the total quality of life; a higher value generally means a better value of the given dimension and increases the total quality of life.

The patients in all the monitored groups evaluated the physical role, i.e. limitation of physical activity because of health state, as the worst part of their quality of life. Mental health was evaluated as the best.

Elderly patients (70 years of age and older) assessed their general physical health to be the worst. The biggest differences are apparent in perceiving the emotional role in the group of men and women, namely 21.8, with a better subjective perception in women. Then quite a big difference was recorded in the categories of Physical Role, evaluated better by women with the difference 11.2, and Pain, tolerated better by men with the difference 9.3.

Table 6

Dependence of final functional state according to FIM on index of quality of life – general mental and physical health SF 36 in patients with stroke in acute phase

	FIM x PCS	FIM x MCS	PCS x MCS
	correlation coefficient	correlation coefficient	correlation coefficient
whole group	0.175 NS	0.053 NS	0.485**
group of women	0.123 NS	0.096 NS	0.557*
group of men	0.237 NS	-0.015 NS	0.469*
group under 70 years of age	0.197 NS	0.067 NS	0.685**
group of 70 years of age and older	0.074 NS	-0.355 NS	0.112 NS

n – number of patients, SD – standard deviation, x – average, $p < 0.001$ – level of statistical significance; FIM – functional independence measure, MCS – total motoric score, PCS –total mental score

DISCUSSION

Rehabilitation in patients after stroke is aimed at achieving maximal functional independence. Rehabilitation treatments were based on the recommended medical treatments of stroke (*13, 14, 15, 16, 1*). In these patients the so-called 24-hour therapy program proved to be suitable requiring cooperation of doctors, attending staff,

physiotherapists, occupational therapists, speech therapists, psychologists, and family members. Successful therapy consists not only in isolated muscle exercising; however, it is important to practice meaningful, goal-directed activities with the patient, e.g. movements in the bed, shifting from supine to sitting position and then to standing position, training of self-attendance, etc. The patient learns to feel better his/her body and to control it in space, to involve the affected parts of his/her body in routine daily activities, and they are more motivated as well.

Motor disablement of a half of the body is the most typical affection of patients after ictus; for most of them, however, the consequences are much more complex. Moving abilities and cooperation of the patient can be complicated, in addition to the loss of locomotion, for the following reasons:

- disorders of muscle tonus, presented either as hypertonia (spasticity) or hypotonia;
- disorders of sensitivity and sensorial functions (neglect, pusher syndrome, hemianopsia);
- psychic troubles, affection of autonomic functions;
- disorder of proprioception, disorder of body perception, loss of balance and equilibrium reactions;
- disorder of stereognosis, dyspraxia, gnostic troubles;
- phatic, communication troubles.

The perception problems mentioned result in disturbing the image of one's own body in space, the so-called *body image*. A goal-directed stimulation of sensomotor functions has, in this case, a considerable therapeutic effect. It must be emphasised that in one-sided affection of brain, also including ictus, significant troubles occur at both sides of the body.

From the acute phase of the disease therapeutic rehabilitation is important for further life of the patient. Several facilitation methods are used for the affection of voluntary locomotion disorder, muscular imbalance, and pathological reflection changes. A number of individual methods were developed, being often named after the authors (NDT = neurodevelopmental treatment – Bobath concept, proprioceptive neuromuscular facilitation – PNF, Brunnström, Rood, Perfetti, Johnstone, Brunkowov, Vojta, Forced Use, sensomotor stimulation method, Biofeedback, Templ Fay, Miřatský, Affolter, *17*). Their common feature is a reflection action leading to facilitation of voluntary locomotion and, at the same time however, to inhibition of the pathological reflection activity (spasticity). In the states after stroke they can already be used in the acute phase, when they influence the recurring of voluntary locomotion and simultaneously the carrying out of purposeful movements in walking and self-attendance activities.

Even if evaluation of the measure of disablement is fundamentally important for assessment of the seriousness of a stroke, it cannot encompass all main factors

influencing the quality of life. They include not only health state, but also social and economic conditions, mental state, fulfilment of aims in life, the cultural and value system in various geographical conditions. The quality of life is a subjectively perceived level of living by means of which people evaluate their physical, emotional, and social abilities (*1, 2*).

Evaluation of the quality of life becomes an integral part of studies in which health state of patients in different branches of medicine is followed for a long time and the conception of the quality of life covers a wide scale of life perception (*2*).

Our results show that patients after stroke achieve a lower number of points in subjective evaluation of the quality of life, and in all aspects, as it had been expected in generic disorders causing disability (*7, 8*).

As the SF-36 questionnaire is a simple and cheap means for determination of the quality of life, the information provided by this questionnaire could be used both before and after specific therapies for determination of changes in the quality of life by means of changes in the points of the patients, concurrently with clinical measurements of seriousness of the disease (*12*).

We asked a question whether there is a dependence of the functional state of patients with stroke (tested by FIM) at the time of their discharging from the clinic and the quality of life evaluated according to SF 36. According to our results there is no statistically significant correlation of both states.

CONCLUSION

The results proved that a complex therapy along with intensive rehabilitation led in patients after stroke in the acute phase to an improvement of their functional state and a reduction of the measure of impairment of motor and cognitive functions; the differences were statistically significant.

The results show that patients after stroke assessed their physical health to be worse than mental health.

We have found no relation between FIM and SF 36 in the group of patients after stroke by means of correlation analysis. There is correlation between the index of General Physical Health and the index of Mental Health, and it is apparent that in younger patients physical health influences significantly mental health. We have not found this significant correlation in patients older than 70 years of age.

192

REFERENCES

1. *Ambler Z.* Cévní příhody mozkové a význam randomizovaných klinických studií [Cerebral strokes and the significance of randomised clinical studies]. Čes Slov Neurol Neurochir 1996; 59: 18–20.
2. *Astrom M, Asplund K.* Handicap and quality of life after stroke. In: Bogousslavsky J, ed. Long term effects of stroke. New York: Marcel Dekker; 2002: 25–50.
3. *Bobathová B.* Hemiplégia dospelých [Hemiplegia of adults]. Bratislava: Liečreh Gúth, 1997. 175 pp. ISBN 80-967383-4-8.
4. *Granger CV, Brownscheidle CM.* Outcome measurement in medical rehabilitation. Intl J Technology Assessment Health Care 1995; 11: 262–268.
5. *Hook O.* Priorities in health and welfare in Sweden. The important role of rehabilitation of persons with disabilities. Scand J Reagan Med 1995; Suppl 33: 25–34.
6. *Chlumský J.* Diagnostika a léčba cévních mozkových příhod [The diagnostics and treatment of cerebral strokes]. Prakt Lék 2000; 6: 314–316.
7. *Iwanenko W, Fiedler RC, Granger CV, Lee MK.* Uniform data system for medical rehabilitation: report of first admission to subacute rehabilitation for 1998. Am J Phys Med Rehabil 2001; 80: 65–61.
8. *Pazdírek J et al.* Functional independence measure in patients with stroke. Chronobiology in Medicine. NCO NZO Brno: LF MU Brno, 2004: 129–133.
9. *Zittoun R, et al.* Assessment of quality of life during intensive chemotherapy bone marrow transplantation. Psychooncology 1999; 8 (1): 64–73.
10. Quality of life for patients with chronic illness http://www.nih.gov/ninr/about/legislation/chronic_illnesss.htm
11. *Curtis JR, et al.* Measure of the quality of dying and death: Initial validation using after-death interviews with family members. J Pain Sympt Management 2002; 24 (1): 17–31.
12. SF-36® Health Survey Scoring Demonstration, http://www.sf-36.org/ SF-36® Health Survey Scoring Demonstration.htm
13. *Janda V, Kraus J.* Neurológia pre rehabilitačných pracovníkov [Neurology for rehabilitation workers]. Martin: Osveta, 1988: 233 pp.
14. *Vaňásková E et al.* Hodnocení nemocných po cévní mozkové příhodě testy soběstačnosti na lůžkovém rehabilitačním pracovišti [Assessment of patients after cerebral stroke by means of self-attendance tests in an inpatient rehabilitation institution]. Rehabilitace a fyzikální lékařství 2003; 2: 60–64.
15. *Vaňásková E, et al.* Náhlé cévní příhody mozkové – testování v rehabilitační péči [Acute cerebral strokes: testing in rehabilitation treatment]. Rehabilitace a fyzikální lékařství 1994; 1: 28–31.
16. *Vaňásková E.* Testování v rehabilitační praxi – cévní mozkové příhody [Testing in rehabilitation practice: cerebral strokes]. Brno: NCONZO, 2004: 65 pp. ISBN 80-7013-398-398.
17. WHO. Rehabilitace po cévní mozkové příhodě [Rehabilitation after cerebral strokes]. Praha: Grada Publishing, 2004: 200 pp. ISBN 80-247-0592–3.