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Functional Assessment of Elderly Patients after Stroke

Ocena funkcjonalna pacjentów w starszym wieku po przebytych udarze mózgu

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Abstract

Introduction. A history of neurological disease often exerts a strong influence on the patient's further life in four basic dimensions: functional, mental, social and spiritual.

Aim. The aim of the study was to perform a functional assessment of an elderly patient after a stroke and to verify whether selected demographic and clinical factors have a significant impact on functional capacity.

Material and Methods. The research was carried out in the Department and Clinic of Geriatrics, University Hospital no. 1 of A. Jurasz in Bydgoszcz on a group of 88 patients after stroke. Functional status was assessed using the Barthel Index — BI, depressive disorders were assessed using the Geriatric Depression Scale — GDS, and higher cognitive functions were assessed using the Mini-Mental State Examination — MMSE.

Results. As a result of the statistical analysis, no statistically significant differences were found in the functional capacity of the patient in the individual measurements (first and second) of Friedman's ANOVA ($N=88$, $df 1=0.32$; $p=0.582$, which means that the patients were classified into the same functional capacity groups, obtaining a similar result in repeated measurements. It was found that gender, age and the number of comorbidities had a statistically significant ($p<0.05$) effect on the functional status of the subjects. There was no statistically significant influence of the place of residence ($p>0.05$) and family situation ($p>0.05$) on the functional status of the respondents. A statistically significant correlation was also found between depressive disorders (Spearman's rank -0.438 ; $p<0.05$) and disorders of higher cognitive functions (Spearman's rank -0.548 ; $p<0.05$) and functional capacity.

Conclusions. In the majority of cases, elderly patients regain functional independence after a stroke. Men showed better functional fitness. Older age and more comorbidities worsen functional performance. It has also been found that the functional state is interdependent with cognitive and emotional disorders. (JNNN 2020;9(2):59–64)

Key Words: functional assessment, older age, stroke

Streszczenie

Wstęp. Przebyta choroba neurologiczna często wywiera silny wpływ na dalsze życie chorego w czterech podstawowych wymiarach: funkcjonalnym, psychicznym, społecznym i duchowym.

Cel. Celem pracy była ocena funkcjonalna chorego w starszym wieku po przebytych udarze mózgu oraz zweryfikowanie czy wybrane czynniki demograficzne i kliniczne mają znaczący wpływ na wydolność funkcjonalną.

Material i metody. Badania przeprowadzono w Katedrze i Klinice Geriatrii Szpitala Uniwersyteckiego nr 1 im. dr. A. Jurasza w Bydgoszczy na grupie 88 pacjentów, po przebytych udarze mózgu. Ocenę stanu funkcjonalnego dokonano za pomocą Barthel Index — BI, ocenę zaburzeń depresyjnych dokonano za pomocą Geriatric Depression Scale — GDS a ocenę wyższych czynności poznawczych dokonano za pomocą Mini-Mental State Examination — MMSE.

Wyniki. W wyniku przeprowadzonej analizy statystycznej, nie stwierdzono istotnych statystycznie różnic w wydolności funkcjonalnej chorego w poszczególnych pomiarach (pierwszym i drugim) ANOVA Friedmana ($N=88$, $df 1=0.32$; $p=0,582$, co oznacza, że pacjenci klasyfikowani byli do tych samych grup wydolności funkcjonalnej, uzyskując zbliżony wynik w powtórnych pomiarach. Stwierdzono, że płeć, wiek i liczba chorób towarzyszących istotnie statystycznie wpływa ($p<0,05$), na stan funkcjonalny badanych. Nie stwierdzono istotnego statystycznie wpływu miejsca zamieszkania ($p>0,05$) oraz sytuacji rodzinnej ($p>0,05$) na stan funkcjonalny badanych. Stwierdzono również, istotną statystycznie korelację pomiędzy zaburzeniami depresyjnymi (rang Spearmana $-0,438$; $p<0,05$) i zaburzeniami wyższych czynności poznawczych (rang Spearmana $-0,548$; $p<0,05$) a wydolnością funkcjonalną.

Wnioski. W większości przypadków chorzy w starszym wieku po przebytych udarach mózgu, uzyskują samodzielność funkcjonalną. Mężczyźni wykazywali lepszą sprawność funkcjonalną. Starszy wiek oraz większa liczba chorób współistniejących pogorsza sprawność funkcjonalną. Stwierdzono również, wzajemną zależność stanu funkcjonalnego od zaburzeń funkcji poznawczych i stanu emocjonalnego. (PNN 2020;9(2):59–64)

Słowa kluczowe: ocena funkcjonalna, wiek starszy, udar mózgu

Introduction

A history of neurological disease often exerts a strong influence on the patient's further life in four basic dimensions: functional, mental, social and spiritual. When talking about functional efficiency, it is considered the ability to self-serve and secure one's own needs, enabling independent functioning in everyday life [1]. The functional capacity considered in this context should be equated with the ability to be independent from others in the field of everyday activities defined in geriatrics as basic or standard ADL (activities of daily living), otherwise: physical ADL — PADL and complex ADL (instrumental activities of daily living — IADL), the performance of which is necessary for independent living in the environment. The most basic life needs in terms of everyday activities include, first of all, such areas as: movement, nutrition, controlling the body's physiological functions, getting dressed and performing hygienic activities. In the scope of IADL, the following activities are considered: shopping, preparing meals, the ability to continue to move and use means of transport, performing work related to running a household, the ability to use the telephone, the ability to take medications independently and financial management. In addition to the basic and complex activities of everyday life, functional capacity also includes higher-level activity, also known as advanced ADL (AADL) activities, which include physical exercise and the ability to travel independently, e.g. by plane. However, this type of activity has not been so well quantified and is not yet commonly assessed in CGA in Polish conditions [2]. The subject of functional disability is particularly important and occupies a significant place in gerontological research. Fitness of the elderly is the result of interacting factors — coexisting pathologies, consequences of injuries and diseases, lifestyle, socio-environmental factors and the aging process itself. The deterioration of the efficiency undoubtedly results in the loss of some functions in the course of the individual aging process and has become the basis for the introduction of a new concept — “functional age”. The aim of introducing this term was to reach “a compromise in determining the degree of individual aging, between the «rigid» counting of calendar years and the unreliable (because insufficient) biological age”. It should be added that the degree of loss of function is the strongest — apart from age — predicting factor for mortality [3].

Disorders of independent functioning in the course of the disease may have a significant impact on the sense of satisfaction and further life activity of the sick person. It seems that one of the main neurological diseases limiting the functional efficiency of the patient is stroke [4–6].

The aim of the study was to perform a functional assessment of an elderly patient after a stroke and to verify whether selected demographic and clinical factors have a significant impact on functional capacity. The overall functional capacity of the patient was analysed and it was checked whether selected demographic factors (gender, age, place of residence, family situation and the number of comorbidities/diagnoses) and clinical factors (depressive disorders, disorders of higher cognitive functions) have a significant impact on the functional capacity of patients after stroke.

Material and Methods

The research was carried out in the Department and Clinic of Geriatrics, University Hospital no. 1 of MD A. Jurasz in Bydgoszcz. Out of the group of 124 people, 88 patients were finally qualified for the study, meeting the previously established selection criteria: the age of the person 65 and older (UN age limit) and clinical history of stroke (within 6 to 12 months from the day of hospitalization). The characteristics of the study group is presented in Table 1. In the prospective studies, two time assessments were used. The first assessment (measurement 1) took place on the first day of hospitalization (admission). Second assessment (measurement 2) on the day of the patient's discharge from the ward (discharge).

The functional state was assessed twice (measurement 1 and 2) using the Barthel Index — BI [7]. The assessment of depressive disorders and higher cognitive functions was performed only in measurement 1 using the Geriatric Depression Scale — GDS [8] and Mini-Mental State Examination — MMSE [9].

Table 1. Characteristics of the study group

Variable	N	%	Min	Max	\bar{x}	SD
Gender						
Women	61	69.3	–	–	–	–
Men	27	30.7	–	–	–	–
Age (mean age and standard deviation 76±2)						
65–74	29	33.0	–	–	–	–
75–89	53	60.2	–	–	–	–
90 and older	6	6.8	–	–	–	–
Place of residence						
City	72	81.8	–	–	–	–
Village	16	18.2	–	–	–	–
Family situation						
Single	27	30.7	–	–	–	–
With a carer	61	69.3	–	–	–	–
Number of comorbidities/medical diagnoses	88	100	0	8	4.2	1.3
Functional state on the day of admission						
BI (<i>Barthel Index</i>)	88	100	20.000	100.000	83.131	19.753
Mood state (depressive disorders)						
GDS (<i>Geriatric Depression Scale</i>)	88	100	0.000	29.000	9.736	4.273
Cognitive status (disturbances in higher cognitive functions)						
MMSE (<i>Mini Mental State Examination</i>)	88	100	19.000	29.000	22.428	4.101

Min — minimum; Max — maximum; \bar{x} — average; SD — standard deviation

Ethical Considerations

The research was approved by the Bioethical Committee of the Nicolaus Copernicus University in Toruń at the Collegium Medicum of LudwikRydygier in Bydgoszcz.

Statistical Analysis

The results were prepared using Microsoft Excel and STATISTICA version 9.1. program. The following methods of statistical description were used in the statistical analysis: position measure — arithmetic mean (\bar{x}), median — (Me), measure of variation — standard deviation (SD), minimum value (Min), maximum value (Max). The χ^2 independence test, Friedman's ANOVA nonparametric test and Spearman's rank coefficient test (r_s) were used. The significance level of $p < 0.05$ was adopted as statistically significant in the study.

Results

Functional state assessment

Assessment of patients by means of BI was performed twice in the first and second measurements (Table 2). For the purposes of statistical analyses, the following criteria were adopted to classify the patient: group I (0–20 points) — very serious limitation of fitness, group II (25–45 points), — severe limitation of fitness, group III (50–70 points) — moderate reduction of fitness, group IV (75–95 points) — slight reduction of fitness and group V — total efficiency (100 points).

On the first day of hospitalization (measurement 1), the overwhelming majority — more than 50% of the respondents were classified as functionally efficient — group IV and V (63 people; 71.5%). On the day of discharge (measurement 2), the vast majority of respondents were also classified into the group of functionally efficient patients — groups IV and V (64 people; 72.7%) (Table 2).

As a result of the performed statistical analysis, no statistically significant differences were found in the mean number of points obtained by the patient in individual measurements (first and second) of Friedman's

Table 2. Functional state assessment in measurement 1 and 2

BI	Measurement 1		Measurement 2	
	N	%	N	%
Group I	3	3.4	3	3.4
Group II	8	9.1	7	7.9
Group III	14	16.0	14	16.0
Group IV	45	51.1	52	59.1
Group V	18	20.4	12	13.6
\bar{x}	83.13		83.62	
Me	90.00		90.00	
SD	19.75		19.22	
Min	20.00		20.00	
Max	100.0		100.0	
ANOVA	0.32			
P	0.582			

ANOVA (N=88, df 1)=0.32; p=0.582. This means that the patients were classified into the same functional capacity groups, obtaining a similar result in repeated measurements.

Selected Demographic Factors (Gender, Age, Place of Residence, Family Situation, Number of Comorbidities/Diagnoses) and Functional Capacity of Patients after Stroke

Selected demographic factors that may have a significant impact on the functional assessment of people over 65 years of age were analysed (Table 3). This study lists the following factors: gender, age, place of residence, family situation and the number of associated diseases/diagnoses.

Analysing the influence of gender on the functional assessment of people over 65 years of age, it was found that this factor had a statistically significant ($p<0.05$) effect on the functional state of the respondents. Detailed statistical analysis showed that men received more points on average, indicating better (greater) functional capacity. It was also found that age is a statistically significant factor ($p<0.05$) influencing the functional assessment of the studied population, which means that with increasing age (people in the oldest age group of 90 years and more), functional fitness deteriorates. The number of comorbidities also significantly ($p<0.05$) differentiated the functional status of the studied people, which means that the greater the number of comorbidities, the worse the functional efficiency.

There was no statistically significant influence of the place of residence ($p>0.05$) and family situation ($p>0.05$) on the functional status of the respondents.

Table 3. Selected demographic factors and functional capacity

BI	Selected factors				
	Gender [†]	Age [‡]	Place of residence [†]	Family situation [†]	Number of comorbidities [‡]
	0.032*	0.000*	0.392	0.984	0.001*

[†]test of χ^2 independence; [‡]Spearman's rank (r_s); * $p<0.05$

Selected Clinical Factors (Depressive Disorders, Disorders of Higher Cognitive Functions) and the Functional Capacity of Patients after Stroke

For the purposes of statistical analyses, the following criteria were adopted to classify the patient: group I (0–9 points) — no depression, group II (10–19 points) — mild depression and group III (20–30 points) — severe depression.

The table below (Table 4) shows that people who were functionally fit (group IV and V BI) were classified much more often into the I group of GDS, i.e. people without depressive disorders. Only 3 people (3.4% of all respondents) from the group of functionally fit (IV and V BI) showed symptoms of severe depression (III — GDS). Similarly, people with severe functional impairment (group I and II BI) were more often classified into group II and III of GDS, indicating symptoms of mild and severe depression — for the BI scale — 10 people.

The performed statistical analysis showed a statistically significant correlation (Spearman's rank -0.438 ; $p<0.05$) between depressive disorders and functional capacity, which indicates the mutual dependence of the functional and emotional state and vice versa.

Table 4. Depressive disorders (GDS) and functional capacity (BI)

BI	GDS					
	Group I		Group II		Group III	
	N	%	N	%	N	%
Group I	0	0	3	3.4	0	0
Group II	1	1.1	6	6.8	1	1.1
Group III	3	3.4	9	10.2	2	2.3
Group IV	34	38.6	9	10.2	2	2.3
Group V	16	18.2	1	1.1	1	1.1

Spearman's rank -0.438 ; $p<0.05$

For the purposes of statistical analyses, the following criteria were adopted to classify the patient: group I (30–27 points) — normal result, group II (26–24 points)

— cognitive disorders without dementia, group III (23–19 points) — mild dementia, group IV (18–11 points) — moderate dementia and group V (10–0 points) — severe dementia. Patients who, according to the MMSE, scored 18 points or less, i.e. with moderate dementia and with severe dementia, were excluded from the analysis.

The table below (Table 5) shows that people who were functionally efficient (group IV and VBI) were classified much more often into the first group of MMSE, i.e. people without cognitive impairment. Only 1 person (1.1% of all respondents) from the group of functionally fit patients (IV and V BI) showed symptoms of mild dementia (III–MMSE). Similarly, people with severe functional impairment (group I and II BI) were classified more often into II and III MMSE groups indicating cognitive impairment without dementia, or mild dementia — 10 people.

The performed statistical analysis showed a statistically significant correlation (Spearman's rank -0.548 ; $p < 0.05$) between the impairment of higher cognitive functions and functional capacity, which indicates the mutual dependence of the functional state on cognitive disorders and vice versa.

Table 5. Higher cognitive dysfunction (MMSE) and functional capacity (BI)

BI	MMSE									
	Group I		Group II		Group III		Group IV		Group V	
	N	%	N	%	N	%	N	%	N	%
Group I	0	0	0	0	3	3.4	0	0	0	0
Group II	1	1.1	1	1.1	6	6.8	0	0	0	0
Group III	2	2.3	11	12.5	1	1.1	0	0	0	0
Group IV	37	42.1	7	7.9	1	1.1	0	0	0	0
Group V	17	19.3	1	1.1	0	0	0	0	0	0

Spearman's rank -0.548 ; $p < 0.05$

Discussion

The functional capacity of the elderly depends on the individual aging process, lifestyle, environmental, social and psychological factors as well as existing diseases, including stroke.

In the studies conducted by Przychodzka et al. [10], it was found that the average state of the respondents in terms of functional performance can be described as moderately severe (moderate severity of disability). When determining the patient's ability to self-care, it can be concluded that the surveyed patients were partially unable to cope with the activities of everyday life. The level of functional capacity of patients after a stroke is low, patients are characterized by a moderate severity of disability. The number of strokes is the

variable that determines the functional capacity of patients after a stroke. Factors such as the patient's age, gender, and time since the occurrence of stroke are not significant.

Research by Bartoszek et al. [11] showed that over half of the patients (58%) are people with full self-care capacity. Stroke patients had a lower level of self-care efficiency than those admitted for other reasons. Cardiovascular, metabolic, respiratory, digestive and musculoskeletal diseases significantly affect the level of functional fitness, as do most disorders of higher nervous activity. Functional capacity decreases with age.

The research carried out by Haor et al. [12] shows that selected socio-demographic factors significantly influenced the greater independence of patients in everyday activities. Among all patients, after the stroke incident, there was a clear improvement in functional efficiency on the day of ending hospitalization. It was also found that men after a stroke show lower functional efficiency compared to women. The advancement of age significantly reduces the functional efficiency after a stroke. The marital status and place of residence do not significantly affect the differences in functional fitness of patients after stroke.

Research conducted by Rynkiewicz et al. [13] showed that during early rehabilitation, patients with right-sided paresis and without disturbances in informational and cognitive functions in the form of aphasia show greater progress in restoring functional abilities, while gender and age do not significantly affect the results.

Research by Miller [14] has shown that the greatest dynamics of functional improvement with the participation of early comprehensive rehabilitation occurs up to 8 weeks after stroke. Early

rehabilitation after stroke results in a significant functional improvement.

Conclusions

In most cases, elderly patients who have suffered a stroke regain functional independence. Men showed better functional fitness. Older age and more comorbidities worsen functional performance. It has also been found that the functional state is interdependent with cognitive and emotional disorders.

Implications for Nursing Practice

Nursing care for patients after a stroke must be highly professional from the very first hours of hospitalization. Proper management, adherence to the rules of care for patients after a stroke and cooperation with the therapeutic team — especially in the aspect of rehabilitation — is very important for the patient's return to independent functioning.

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