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The impact of cognitive impairment after stroke on activities of daily living

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Abstract. Aim: The aim of the present study was to explore the impact of cognitive impairments on the ability to perform activities of daily living (ADL) in stroke patients. Materials and Methods: For this study, 75 patients with stroke were recruited at the Hospital of Psychiatry and Neurology Oradea. The patients were evaluated using Mini Mental State Examination, ADL scale and IADL scale. Cognitive function was evaluated using MMSE, RAVLT and verbal fluency test (semantic and phonetic). Results: Significantly higher proportions of the patients with cognitive impairment were more dependent. Conclusions: Cognitive dysfunction has a strong impact on ADL dysfunction. These results are important for clinical practice and future research, because cognitive dysfunction after stroke has implications for rehabilitation and planning longer-term needs.

Key Words: stroke patients, cognitive impairment, activities of daily living.

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Introduction

Stroke is a major cause of long-term physical, neuropsychiatric, and neuropsychological disability (Murray 1997) and has a big impact on daily life activities (Cardol et al 2002). 85% of people who survive after a stroke will return home (Reutter-Bernays&Rentsch 1993). Functional capacity refers to the possibility and ability to carry out the daily activities in a normal or accepted way (Millán-Calenti 2009). Maintenance of functional capacity is an important indicator of health in the elderly; the loss of this capacity leads to a rise in morbidity and mortality (Stuck et al1999).

Stroke can result in a wide range of deficits affecting cognitive functions (Tatemichi et al 1994; Nys et al 2005), not only in the acute phase but also in the long term (Claesson 2005). When cognitive deficits are not identified and compensated for, they can lead to restrictions in daily life activities (Viscogliosi et al 2011, Pohjasvaara et al 2002; Jette et al 2005), even if the deficits are mild (Wilkinson et al 1997; Rochette et al 2007).

Cognition is divided into four major classe: receptive functions, which implies the abilities to select, acquire, classify and integrate information; memory and learning, which refer to information storage and retrieval; thinking, which involves the mental organization and reorganization of information; and expressive functions, which are the means through which information is communicated or acted upon (Cederfeldt et al 2010; Lezak 2004). Cognitive deficits following a stroke are very frequent, do not occur uniformly (Viscogliosi et al 2011; Bouchard&Mackey 2007), and can vary in type, severity and impacts on the accomplishment of daily life activities (Sveen et al 1999).

After a stroke, as many as 55% of people have deficits in episodic memory, up to 40% show deficits in executive functions and language deficits affect 23% of people (Lincoln et al 1998). Moreover, deficits in episodic memory (Hanks et al 1999), executive functions (Grigsby et al 2002), visual attention (Chen et al 1993) and language (Duncan et al 2005) are associated with difficulties in the capacity to accomplish activities of daily living (ADL) and instrumental activities of daily living (IADL). Thus stroke results in a number of cognitive deficits that have a significant impact on the ability to carry out activities of daily life (Viscogliosi et al 2011).

The results regarding the impact of cognitive impairments on ADL in elderly persons in the acute phase are contradictory. The association between cognitive impairment and ADL was moderate in one study (Man et al 2006), weak in another study (Fong et al 2001) and entirely absent in a third study (Hajek et al 1997). Also, for the long term influence on cognitive impairments on ADL the results are also contradictory. Two studies did find an association (Patel et al 2003; Agrell et al 2000) between cognitive impairment and ADL in the long term, but other studies didn't find an association (Zinn et al 2004; Daviet et al 2006) The aim of the present study was to explore the impact of cognitive impairments on the ability to perform activities of daily living (ADL) in stroke patients.

Material and methods

For this study, 75 out-patients with stroke were recruited at the Hospital of Psychiatry and Neurology Oradea, between September 2014 - June 2015.

Participants were selected based on the inclusion criteria that consisted of: stroke diagnosis by a neurologist according to the WHO (1983)-criteria and confirmed by clinical history, neurological examination, and imaging via computed tomography or magnetic resonance imaging, age over 65 year old, absence of acute disorders such as cancer and/or tumors; scoring 11 or more in the Mini Mental State Examination (MMSE), absence of depression prior to stroke; absence of intellectual disability; and no history of drug abuse.

We excluded patients with bilateral hemiplegia, lack of motor involvement, severe cognitive impairment, history of depression and intellectual disability.

Cognitive function was evaluated using MMSE, RAVLT and verbal fluency test (semantic and phonetic).

Mini Mental State Examination (MMSE) with 6 subscales for orientation, registration, attention, calculation, recall, and language and praxis tests was used to estimate the severity of cognitive impairment and to classify patients as having a clinical level of cognitive impairment (Folstein et al 1975).

The Rey Auditory Verbal Learning Test (Rey 1964) uses a simple format in which the client is asked to remember a list of 15 unrelated words (List A) repeated over five different trials. The client is then presented with another list of 15 unrelated words (List B), which serves to potentially interfere with previous learning, followed by a request to recall as many of the words from the original list as possible. After a 30-minute delay, the client is again asked to recall words from the original list (List A), following which he or she is asked to recognize as many words as possible in a list that includes words from the original list. As a result, a wide diversity of functions can be assessed. These include short-term auditory-verbal memory, rate of learning, learning strategies, retroactive and proactive interference, presence of confabulation or confusion in memory processes, retention of information, and differences between learning and retrieval. The entire procedure takes 10 to 15 minutes. A Romanian version of the RAVLT was used (Druțu 1975).

The procedure for verbal fluency tests allows the participant 60 seconds to generate as many words as possible. On tests of phonemic fluency, words must begin with a specified letter such as ''p'', and on semantic fluency, words must belong to a specified category such as animals.

The ability to perform activities of daily living was assessed using two scales: ADL and IADL.

The Activity of Daily Living -ADL scale (Katz et al 1963) is a carer-rated instrument consisting of six daily-living abilities including basic tasks of personal care in everyday life, including bathing, continence, transfers, feeding, dressing and transferring. For this study, the questionnaire responses were made on to a Likert scale ranging from 0 (completely dependent) to 2 (independent).

The Instrumental Activities of Daily Living -IADL scale (Lawton&Brody 1969) measures the activities related to independent living. It is a carer-rated instrument consisting of seven daily-living abilities includes items related to using the telephone, preparing meals, taking medicine, traveling, shopping for groceries or personal items, performing light or heavy housework and managing money. In a similar way to the ADL, every activity is rated on a scale that includes three choices: person is independent, person requires assistance and person is completely dependent on others. For this study, the questionnaire responses were made using a Likert scale ranging from 0 (completely dependent) to 2 (independent).

All the tests are translated and validated into Romanian.

Written consent was obtained from the participants. Completion of the questionnaires was voluntary. Permission was obtained from Ethical Committee of University of Medicine and Pharmacy Oradea prior to the start of the study.

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 20.

Distributions of the studied variables were examined using Shapiro-Wilk's tests. Statistical significance was assumed at α ≤ 0.05. Because the data wasn't normally distributed we used non-parametric statistics - Mann-Whitney U and Spearman Rho.

Results

Fifty-four patients (72%) had a MMSE under 24 points and presented cognitive impairment. 21 patients (28%) had a MMSE between 25-30 and were considered to be without cognitive impairment.

The main demographic characteristics of the study sample are reported in Table 1.

Table 1. Demographic characteristics of the study sample (N=75)

Variables	Stroke Patients with cognitive impairment (N=54)	Stroke Patients without cognitive impairment (N=21)	p
Gender male N(%)/female N(%)	24 (44.4%)/30 (55.6%)	10 (47.6%)/11 (52.4%)	>0.05
Mean age±SD (years)	69.51±10.33	64±6.7	<0.05
Mean number of years in school±SD	11.3±3.48	10.7±3.43	>0.05

The patients without cognitive impairment are younger then the patient with cognitive impairment.

Table 2 showed the cognitive performance in stroke patients with and without cognitive impairment on MMSE.

Table 3 showed the scores on the daily activities in stroke patients (with and without depression). Mean score of IADL performances of patients without cognitive impairment were higher than in patients with cognitive impairment (p<0.001). Mean score of ADL performances of patients without cognitive impairment were higher than in patients with cognitive impairment (p<0.001).

There was a significant negative correlation between ADL and RAVLT1 (Spearman rho=-0.508, p<0.01), RAVLT2 (Spearman rho=-0.438, p<0.01), RAVLT 1&2 (Spearman rho=-0.321, p<0.01), RAVLT recognition (Spearman rho=-0.495, p<0.01), semantic fluency animals (Spearman rho=-0.351, p<0.01) and phonetic fluency (Spearman rho=-0.316, p<0.01).

Discussions

In this research we had studied the impact of cognitive impairments on the ability to perform activities of daily living (ADL)

Table 2. Cognitive performance in stroke patients with and without cognitive impairment

Variables		N	Median	Minimum	Maximum	p
RAVLT first trial memory score	without cognitive impairment	21	4	3	6	<0.001
	with cognitive impairment	54	7	4	10	
RAVLT second trial memory score	without cognitive impairment	21	4	1	6	<0.001
	with cognitive impairment	54	6	3	9	
RAVLT first and second trails	without cognitive impairment	21	5	3	9	<0.001
	with cognitive impairment	54	8	4	15	
RAVLT recognition	without cognitive impairment	21	7	4	11	<0.001
	with cognitive impairment	54	13	6	15	
Semantic fluency animals	without cognitive impairment	21	4	1	14	<.001
	with cognitive impairment	54	13	6	23	
Phonetic fluency letter p	without cognitive impairment	21	4,5	0	11	<0.001
	with cognitive impairment	54	11	2	18	

Table 3. Daily activities in stroke patients with and without cognitive impairment

Variables		N	Median	Minimum	Maximum	p
ADL	without cognitive impairment	21	2	0	7	<0.001
	with cognitive impairment	54	6	2	7	
IADL	without cognitive impairment	21	36	17	50	<0.001
	with cognitive impairment	54	22	17	31	

in stroke patients. ADL impairments, such as shopping, housework/gardening, using transport, mobility, and bathing, are frequent in older stroke patients

Significantly higher proportions of the patients with cognitive impairment were more dependent. The most common activities in which help was needed were cleaning, shopping and personal care. There was an association between cognitive impairment on MMSE and ADL (Spearman rho=-0.458, p<0.01).

The present study showed that a higher MMSE score is associated with a better performance on memory and verbal fluency task. Our results are similar of those of Claesson et al 2005 who showed that people with mild global impairments after stroke had significantly greater difficulty with a wide range of ADL tasks Results of other studies on cognitive impairment and stroke are very different regarding the follow-up time after stroke, age distribution of the patients and assessment methods, thus making it difficult to compare data between them.

Conclusions

Cognitive dysfunction has a strong impact on ADL dysfunction. These results are important for clinical practice and future research, because cognitive dysfunction after stroke has implications for rehabilitation and planning longer-term needs.

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