Profile of Upper Extremities Function among Stroke Outpatients in Dr. Hasan Sadikin General Hospital, Bandung

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Abstract

Background: Stroke is one of the leading causes of death and disabilities worldwide. Among all types of disabilities, disturbance in upper extremities functions is at the highest percentage. This study aimed to determine the profile of upper extremities function among stroke outpatients in Dr. Hasan Sadikin General Hospital Bandung as an initial step to provide a better follow up and management.

Methods: The design of this study was a descriptive study, conducted from April to October 2014 among stroke outpatients in the Department of Physical Medicine and Rehabilitation Dr Hasan Sadikin General Hospital, Bandung based on a consecutive sampling method. The function of upper extremities was tested by Chedoke Arm and Hand Integrated version 9 (CAHAI-9).

Result: In total, 42 patients were included, consisting of a male (n=25) and a female (n=17). Nine tasks were performed with dependently by the patients such as open the coffee jar (n22; 52%), call 118 (n24;57%), draw a line with a ruler (n22;52%), pour a glass of water (n33;79%), wring out washed cloth (n26;62%) do up five-button (n31;74%), dry back with the towel (n25;60%), put toothpaste on a toothbrush (n25;60%), and cut medium resistance putty(n32;76%).

Conclusions: The majority of stroke outpatients in the sub-acute phase still have a dependent function of upper extremities. Better patient management and interventions focusing on this function need to be enhanced for a better outcome.

Keywords: CAHAI-9, disability, impairment, stroke, upper extremities

Introduction

Stroke is one of the leading causes of disability in the older population, involving many aspects of life such as physical, emotional, and social life. As stroke mortality rates decline, these older people are more likely to have residual impairments that affect their activity of daily living (ADL).[1] The prevalence of stroke in Indonesia is about 7 per 1000 population and mostly aged 45 years old and older are affected. Dr. Hasan Sadikin General Hospital in Bandung as a referral hospital has more than 500 stroke patients admitted every year.[2,3]

Stroke affects not only patients, but their family members are also involved and have to deal with the sequeles of its residual impairments. Consequently, post-stroke related-disability continues to be another point of concern.[4] This is shown by several stroke impact measures that have been developed, such as Health-Related Quality of life (HRQoL) and Stroke Impact Scale (SIS). The World Health Organization (WHO) has published the International Classification of Impairments, Disabilities, and Handicaps in 1980, which is frequently used in classifying stroke after its effect.[5]

It has been reported previously that there is 2,490 billion disability-adjusted life years (DALYs) or 361 DALYs per 1000 population. Among all the diseases mentioned, cardiovascular and circulatory diseases are accounted for 11.8% of global DALYs; the major diseases within this group are ischemic heart disease (5.2%), hemorrhagic stroke (2.5%), ischemic stroke (1.6%), and hypertensive heart disease (0.6%).[6] Approximately, 75% of stroke survivors have upper extremities (UE)

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impairment and half of them have to learn to compensate by using less-involved hand.[7] The UE makes a significant contribution to most ADL and UE impairment can compromise participation in many essential and meaningful tasks.[1]

Regarding the evidence of high post-stroke UE disturbance, data of the post-stroke UE function's profile is necessary for further management.[1] Various UE measurements are available to examine the UE function. One of them is the Chedoke Arm and Hand Activity Inventory (CAHAI), a new validated upper-limb measurement using a 7-point quantitative scale to assess functional recovery of the arm and hand after a stroke attack. There are 4 versions of CAHAI, including CAHAI-7, CAHAI-8, CAHAI-9, and CAHAI-13. The number shows the total tasks that must be performed by patients. The examiners have options to choose any version without risking a significant finding that may influence the validity of the test. The internal consistency among CAHAI tests is 0.98, suggesting that there is an item's redundancy that by doing only 6 items the result can achieve 0.95 consistency. The objective of this study was to explore the profile of UE function among stroke outpatients in Dr. Hasan Sadikin General Hospital, Bandung.

Methods

The design of this study was a descriptive study, conducted from April to October 2014 among stroke outpatients in the Department of Physical Medicine and Rehabilitation, Dr. Hasan Sadikin General Hospital based on the consecutive sampling method. Patients were first signed informed consent to participate in this research. Data on age, the onset of stroke, and paretic side of the UE were collected before the test. The onset of stroke was grouped as the sub-acute onset of 2 weeks to 6 months and chronic onset > 6 months.

The tasks of CAHAI-9 consisted of nine activities, described followed; 1) open the coffee jar, 2) call the local emergency number 118, adapted from 911 the USA emergency number, with personal communication with Susan Barecca, founder of CAHAI, 3) draw line with a ruler, 4) pour a glass of water, 5) wring out the washcloth, 6) do up five buttons, 7) dry back with a towel, 8) put toothpaste on the toothbrush, and 9) cut medium resistance putty. The examiner observed how the patients carried out the tasks and interpreted the score. Subsequently, the UE function was measured with Chedoke Arm and Hand Inventory version 9 (CAHAI-9) followed by the 7-points scale of interpretation.[8] The score of 1–5 was interpreted as 'need for assistance and supervision', and a score of 6–7 was interpreted as 'modified and total independence'. Each task was further categorized into an 'independent' and 'dependent' group, meaning that in performing daily activities, whether patients still at least needed some assistance in the period of their post-stroke recovery. The number of respondents performing the tasks was summed up and described in

Table 1 Basic Characteristic of Stroke patients in Dr. Hasan Sadikin General Hospital, Bandung

Variables	Frequency	Percentage (%)
Age (years old)		
≤44	5	12
45–54	11	26
55–64	21	50
65–74	5	12
Onset of Stroke		
sub-acute	27	64
chronic	15	36
Paretic Side		
Right	24	57
Left	18	43

Note: Sub-acute onset 2 weeks to 6 months. Chronic onset > 6 month.

Table 2 The 7-point Scale for CAHAI-9 and the Interpretation among Post-stroke Patients (n=42) in Dr. Hasan Sadikin General Hospital.

	CAHAI-9 Tasks	Scale*							Interpretation			
		1	2	3	4	5	6	7	Dependent		Independent	
									n	%	n	%
1.	Open the coffee jar	**12**	**2**	**2**	**3**	**3**	**10**	**10**	22	52%	20	48%
2.	Call 118	13	4	2	1	4	11	7	24	57%	18	43%
3.	Draw a line	5	11	-	1	5	12	8	22	52%	20	48%
4.	Pour a glass	10	5	1	5	12	5	4	33	79%	9	21%
5.	Wring out the washed cloth	11	4	2	5	4	6	10	26	62%	16	38%
6.	Do up five buttons	12	2	5	4	8	8	3	31	74%	11	26%
7.	Dry back with a towel	11	3	5	1	5	8	9	25	60%	17	40%
8.	Put toothpaste on a toothbrush	11	3	2	3	6	8	9	25	60%	17	40%
9.	Cut a medium putty	12	3	3	3	11	6	4	32	76%	10	24%

Note: *CAHAI; Chedoke Arm and Hand Activity Inventory. The 7-points scale to CAHAI-9 tasks was given to the patients; score 1 to 5 as a need for assistance and supervision and interpreted as a dependent; score 6-7 as modified and total independence and interpreted as an independent.

percentage. The study was approved by the Health Research Ethics Committee Faculty of Medicine, Universitas Padjadjaran.

Results

In total, 42 post-stroke patients were included, with the age ranging from 44 to 74 years old of whom most patients (n=21;50%) were in the group of 55 to 64 years old followed by younger age group of 45–54 years old (n=11; 26%) as shown in Table 1. Based on the onset of stroke, the sub-acute onset was higher than the chronic onset (n=27;64%). All subjects had their right side as their dominant upper extremity (UE)of whom most of the patients had right UE paresis (n=24;57%).

Of the tasks performed according to CAHAI-9 tasks, most patients were dependently in doing the 9 tasks as the following result; open the coffee jar (n=22;52%), dial 118 (n=24;57%), draw a line with a ruler (n=22;52%), pour a glass of water, (n=33;79%), wring out the washed cloth (n=26;62%), do up five button (n=31;74%), dry back with a towel (n=25;50%), put toothpaste on a toothbrush (n=25;60%), cut a medium putty (n=32;76%).

Discussion

After the interpretation of the CAHAI-9 score, the result of this study shows that most of the post-stroke patients are still dependent on performing the daily activities and still at least need some assistance in the period of their post-stroke recovery.

The recovery of UE becomes very important regarding its significant role in ADL. A profile of UE function in performing basic daily tasks is required before therapy, treatment, and further management. CAHAI-9 as the measurement tool has been used considering its good clinical utility and representative outcome of daily UE function that correlates with impairment.[9]

Our study has shown that age group 55–64 years old reached the highest percentage among all groups (51%), which is different from a preceding study conducted by Construction of National Surveillance System for Cardiovascular and Cerebrovascular Disease of Korean Neurological Association with their highest percentage (88.8%) of DALY lost due to stroke in the age group 65–74 years old.[10] Interestingly, there is an increasing incidence of ischemic stroke in the young (age 20–54) for both black and white patients over time. National data of Canada shows that the risk factors of stroke are increasing in young ages, especially in people with obesity and diabetes. Lifestyle changes are assumed to be the leading cause of this phenomenon of the dropping age of stroke onset in society.[11]

All subjects in this study have their right UE as the dominant side. Right, and left paretic sides occurred in 57% and 43%, respectively. The involvement of UE in stroke can be explained by the evidence of the middle cerebral artery (MCA) infarct as the most common type of stroke.[12,13] The relation

between UE impairment and its functional "use" and "non-use" phenomenon shows the compensation of the non-paretic side to learn to do more tasks. Consequently, the paretic side will not be used to its full capacity. Considerable non-use of the paretic side, both in duration and in intensity, and both during unimanual and bimanual activities in patients with chronic stroke have been reported as such the patients compensate for this with the increased use of the non-paretic side.[14] This may lead to the poor outcome of the paretic side. However, several training programs can improve the outcome of the paretic side by using non-paretic UE as a "teaching hand" to the paretic side. Bilateral transfer (BT) occurs in the stroke patients with the same phenomenon features as noted in the healthy individuals, with a higher incidence among men and a bigger effect when the trained healthy hand is the dominant one, to the paretic non-dominant hand.[15]

Most subjects in this study are sub-acute patients (64%). Early after the stroke onset or in an acute setting, the patients need to be properly managed considering the emergency condition of admission to limit morbidity and mortality.[16] The onset of stroke is a very important aspect to note regarding the outcome of stroke-related impairment. There is a critical-time window during the first 3 months after stroke when most plasticity can be expected. However, the improvement of activities after stroke, such as dexterity is mainly driven by learning compensation strategies rather than by neural repair. The strategies can be performed by learning to re-use the same body segments in the same way as subjects did before the stroke.[17]

The objectivity of the examiner is of important to measure UE daily function based on the CAHAI test. The profile of UE function after stroke shows the relation of impairment degree and functional use. Although there is no interpretation of total scoring, CAHAI proves that there is a strong relation between UE impairment and its function. As the severity of UE impairments increases, the CAHAI score will decrease. The CAHAI-9 has been used in this study according to its affordability and performance effectiveness.

The outcome in this study is categorized into the dependent and independent groups. Most tasks have been measured as a dependent. The dependent group contributes to more than half of the total subjects in each task of the measurement. The interpretation is explained based on each task since there is no total score interpretation. The absence of total score interpretation would not be a problem since the total score itself already show the correlation between impairment severity with UE function (personal communication with Barecca, et al.). The more severe the impairment is, the lower the CAHAI total score will be.

In order not to put aside other aspects, the recovery of motor impairment should be considered since this motor impairment is determined by several factors such as the salvation of penumbral tissue in the first days to weeks after stroke, the alleviation of diaschisis, the homeostatic and learning-dependent (Hebbian) neuroplasticity, and the behavioral compensation strategies. These mechanisms underlying recovery are very interactive and operate in different and limited time-windows after stroke onset.[14]

There are some limitations in this study; first, the absence of total score interpretation of CAHAI makes the categorization of the outcome less clear. However, the 7-point scales represent the direct and clear correlation between impairment and functional loss of the impaired UE. Second, the variables in this study are limited. Further research should consider including demography data and other basic characteristics of the respondents, depending on the study intention.

The profile of UE function after stroke can be beneficial to the proper management including therapy, medication, and education. A point to concern is the education part; patients should independently practice the CAHAI tasks and keep doing other safe daily tasks to train their impaired UE at home to maximally regain its function.

To conclude, our study shows that the upper extremities function of more than half stroke outpatients is dependent. This result may serve as information for better patient management and intervention to obtain better outcomes of post-stroke patients.

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