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COMPARISON OF OUTCOMES AND COGNITIVE FUNCTION IN ACUTE STROKE PATIENTS TREATED AT THE STROKE CORNER OF H. ADAM MALIK GENERAL HOSPITAL MEDAN WITH THOSE TREATED IN WARD OF KESDAM BUKIT BARISAN HOSPITAL MEDAN

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DOI: https://doi.org/10.29121/ijrsm.v7.i8.2020.13

Keywords: MMSE, CDT, NIHSS, Cognitive Function, Acute Stroke, Stroke Corner.

Abstract

Background: Stroke is a serious neurological problem that is mostly found in the world, and cognitive impairment is often found in the first few weeks after a stroke, where disturbances in the perception and executive functions are mostly found.

Aim: To find out the comparison of outcomes and cognitive function in acute stroke patients treated at the Stroke Corner of H. Adam Malik General Hospital Medan with those treated in the Ward of Kesdam Bukit Barisan Hospital Medan.

Methods: This research is descriptive analytic with cross sectional data collection method with primary data source obtained from 44 patients who suffered an acute stroke and was treated at the Stroke Corner of H.Adam Malik General Hospital in Medan and Ward at Kesdam Bukit Barisan Hospital. Then MMSE and CDT were examined to assess cognitive function and NIHSS at initial and day 14 to assess patient outcomes. To assess the comparison of cognitive functions and patient outcomes, a bivariate analysis was performed. Normality test with the Komogrov-Smirnov test, then the Chi Square test was performed and was declared significant if p values <0.05 were obtained.

Results: After Chi Square test, it was seen that there were significant differences in cognitive function as measured by MMSE and CDT scores between patients treated at the two hospitals with p value = 0.012 (p <0.05) and p value = 0.004 (p < 0.05), respectively. Then, with the chi square test found significant differences in patient outcomes as measured by the initial NIHSS score and day 14 with p value = 0.018 (p <0.05) and p value = 0.011 (p <0.05), respectively.

Conclusions: Significant differences in cognitive function and outcome in acute stroke patients were found between treatment at Stroke Corner H. Adam Malik General Hospital Medan and Ward at Kesdam Bukit Barisan Hospital Medan.

Introduction

In Indonesia, National stroke data shows the highest mortality rate of 15.4% as a cause. Stroke as a serious neurological problem that is most often found in the world, is still a major contributor to morbidity, functional disability and mortality, both in developed and developing countries. The prognosis of stroke patients can recover completely or cause motor, sensory, and sublime function defects including impaired cognitive function that can progress to dementia.[1,2]

In a cross sectional study conducted in Sweden, the prevalence of stroke was 10% in men and 8% in women, then a third of those who survived were found to have cognitive impairment 3 times higher than those without stroke. Impaired cognitive function after the first acute stroke by 28.9% and most are elderly, low education level, lesions in the left hemisphere and dysphasia.[3]

One of the main advances in stroke care is routine management of patients in the stroke care unit. Immediately after a stroke, cognitive impairment is seen in ≈70% of patients. This is because cognitive function is most important for neurological domain recovery where patients with higher cognitive status when entering rehabilitation have better functional outcomes and shorter rehabilitation periods are needed. Patients with cognitive impairment have an increased risk of poor functional outcome, duration of treatment, and increased mortality. The treatment process looks better in patients treated in stroke units compared to other treatments. Overall, the risk of death for patients who received stroke unit care was estimated to be ≈75% of the risk for those who did not have stroke unit care (95% CI, 60 to 90).[4,5]

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The National Institutes of Health Stroke Scale will detect patients who have severe communication disorders or visuospatial problems that may require a customized approach based on assessment. For cognitive assessment of stroke, although a large number of examinations are available, only Folstein Mini-Mental State Examination with the most optimal meta-analysis results.[6]

Methods

Research subject

The study subjects were drawn from acute phase stroke patients which treated in Stroke corner Haji Adam Malik General Hospital Medan and Ward at Kesdam Bukit Barisan Hospital. A total sample size was 22 patients for each group, which met the inclusion criteria which is acute phase stroke patients who were treated at the Stroke corner of H. Adam Malik General Hospital Medan and Ward of Kesdam Bukit Barisan Hospital Medan and had a clinical head CT scan done, compos mentis and cooperative awareness, can speak Indonesian, able to read and write, give consent to participate in research; and exclusion criteria which is patients with a history of recurrent stroke and speech disorders (aphasia).

Research design

This research is descriptive analytic with cross sectional data collection method with primary data sources obtained from all patient populations who have experienced an acute stroke and are treated in Stroke corner Haji Adam Malik General Hospital Medan and Ward at Kesdam Bukit Barisan Hospital. All patient populations who have been recruited signed an agreement to participate in the study then filled out questionnaires, performed MMSE, CDT, and NIHSS examinations.

Statistical Analysis

Research analysis data will be analyzed statistically with the help of the *Windows* SPSS *(Statistical Product and Science Service*) computer program version 22.0. To see the difference in mRS and NIHSS values ; outcomes; and difference in CDT and MMSE values of research subjects between acute stroke patients treated in Stroke corner and Ward, Chi square test was done where it was said to be significant if p value <0.05.

Results

Characteristics of Research Samples

Based on the table below it appears that based on the age, majority of patients aged between> 50-60 years with a total of 26 people (59.1%), followed by 10 people (22.7%) aged> 60-70 years and 8 people (18, 2%) aged between> 40-50 years. For Gender, it appeared that 25 patients (56.8%) were female and the remaining 19 were male (43.2%). If grouped by occupational status, it appears balanced where 24 patients (54.5 $) unemployed while 20 patients (45.5%) still work. Based on education level, the majority of patients graduated from high school and junior high school with 15 people (34.1%) and 14 people (31.8%) in sequence, followed by 7 diploma graduates (15.9%), 5 elementary school graduates (11,4%) and only 3 people graduated bachelor (6.8%). Judging by ethnic differences, the majority of Batak ethnic patients with 27 people (61.4%), the rest are Javanese and Acehnese with 8 people (18.2%) and 9 people (20.5%), respectively. For treatment, it appears that both samples have the same value, each with 22 patients (50%) for each hospital.

At the time of cognitive function research, a number of examination methods were carried out, the first being MMSE, which found almost the same results with 17 patients (38.6%) normal (score> 24), 14 patients (31.8%) mild cognitive impairment (MCI) (score 18-23) and 13 people (29.5%) with abnormal cognitive function (score <17). The second method uses CDT, 29 patients (65.9%) were found to be within normal limits (score = 4) while the remaining 15 patients (34.1%) showed abnormal results (score <4). Meanwhile, to assess the outcome, the method used is NIHSS which is carried out at the beginning and 14th day. At the initial NIHSS examination, 19 patients (43.2%) with mild clinical outcomes (<5), followed by 15 patients (34.1%) with moderate clinical outcomes (5-14) and 9 patients (20.5%)) with severe clinical outcome (> 15). Similar to the previous examination, on the 14th day the NIHSS results also showed the majority of patients were 19 people (43.2%) in the mild category (<5), followed by 15 people (34.1%) in the moderate category (5-14) and 10 people (22.7%) severe category (> 15).

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Judging from the risk factors for acute stroke, it appears that 35 patients (79.5%) had hypertension and only 9 patients (20.5%) without a history of hypertension. This result is inversely proportional to the history of diabetes mellitus, which found 36 patients (81.8%) did not have that history and only 8 patients (18.2%) suffered it. In line with the results of cholesterol tests, 39 patients (88.6%) with cholesterol results within normal limits while 5 patients (11.4%) with abnormal cholesterol levels. Similar to the history of heart disease, 42 patients (95.5%) claimed to have no history and only 2 patients (4.5%) had it.

Table 1. Characteristics of Research Samples

	Characteristics	n (patients)	Percentage (%)
Age	>40-50 years old	8	18,2
	>50-60 years old	26	59,1
	>60-70 years old	10	22,7
Gender	Male	19	43,2
	Female	25	56,8
Occupational	Work	20	45,5
	Unemployed	24	54,5
Education	Elementary School	5	11,4
	Junior High School	14	31,8
	Senior High School	15	34,1
	Diploma	7	15,9
	Bachelor	3	6,8
Ethnic	Bataknese	27	61,4
	Javanese	8	18,2
	Acehnese	9	20,5
Hospital Care	H Adam Malik General Hospital	22	50
	Kesdam Bukit Barisan Hospital Medan	22	50
MMSE	Abnormal (<17)	13	29,5
	MCI (18-23)	14	31,8
	Normal (24-30)	17	38,6
CDT	abnormal (skor < 4)	15	34,1
	Normal (skor = 4)	29	65,9
NIHSS Initial	Severe (≥ 15)	9	20,5
	Moderate (5-14)	16	36,4
	Mild (<5)	19	43,2
NIHSS 14th day	Severe (≥ 15)	10	22,7
	Moderate (5-14)	15	34,1
	Mild (<5)	19	43,2
Hipertension	Yes	35	79,5
	No	9	20,5
Diabetic Mellitus	Yes	8	18,2
	No	36	81,8
Cholesterol	Yes	5	11,4
	No	39	88,6
History of heart disease	Yes	2	4,5
	No	42	95,5

Comparison of Cognitive Functions Patients treated at H Adam Malik General Hospital and Kesdam Bukit Barisan Hospital Medan

From table 2. It appears that with MMSE examination, the majority of patients treated at Kesdam Bukit Barisan Hospital in Medan were categorized as abnormal (score <17) with a total of 10 people (45.5%) followed by 8 people (36.4%) with MCI (score 18 -23) and 4 remaining normal (score> 24) (18.2%). Whereas in RSUP Adam Malik Medan it appears that the majority of patients are in the normal category (score> 24) with a total of 13 people (59.1%) followed by 6 MCI patients (score 18-23) (273%) and only 3 patients are in the abnormal category.

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(score <17) (13.6%). With the chi square test, it was found that there was a significant difference in cognitive function as measured by MMSE scores between patients who were treated at the stroke corner of Haji Adam Malik General Hospital Medan and who were treated at the Ward of Kesdam Bukit Barisan Hospital with p value = 0.012 (p <0.05).

Table 2. Comparison of Cognitive Functions Patients treated at H Adam Malik General Hospital and Kesdam Bukit Barisan Hospital Medan

Hospital Care	MMSE			P value*
	Abnormal	MCI	Normal	
Kesdam Bukit Barisan Hospital Medan	10 (45,5%)	8 (36,4%)	4 (18,2%)	0,012
H Adam Malik General Hospital Medan	3 (13,6%)	6 (27,3%)	13 (59,1%)	

**chi square*

Comparison of CDT Results in Patients treated at H Adam Malik General Hospital and Kesdam Bukit Barisan Hospital in Medan

It appears that with CDT examination, the majority of patients at Kesdam Bukit Barisan Hospital as many as 12 people (54,%) are abnormal (score <4) and 10 people (45.5%) are normal (score = 4). In contrast to patients at RSUP Adam Malik Medan where 19 patients (86.4%) were normal (score = 4) and only 3 patients (13.6%) were abnormal (score <4). With the chi square test, it was found that there were significant differences in cognitive function as measured by CDT scores between patients treated at the stroke corner of Haji Adam Malik General Hospital Medan and those treated at the Ward of Kesdam Bukit Barisan Hospital with p value = 0.004 (p <0.05).

Table 3. Comparison of CDT Results in Patients treated at H Adam Malik General Hospital and Kesdam Bukit Barisan Hospital in Medan

Hospital Care	CDT		P value*
	Abnormal	Normal	
Kesdam Bukit Barisan Hospital Medan	12 (54,5%)	10 (45,5%)	0,004
H Adam Malik General Hospital Medan	3 (13,6%)	19 (86,4%)	

**chi square*

Comparison of Initial NIHSS Results in Patients treated at H Adam Malik General Hospital and Kesdam Bukit Barisan Hospital Medan

For the initial NIHSS examination, it appears that patients at Kesdam Bukit Barisan Hospital did not show a significant variation of results in which 8 patients (36.4%) with moderate (5-14) and severe clinical outcomes (> 15), respectively and only 6 patients (27.3%) included in the mild category (<5). Whereas for patients treated at H Adam Malik General Hospital, 13 patients (59.1%) with mild clinical outcome, followed by 8 patients (36.4%) in the moderate category and only 1 (4.5%) patients included in the severe category . With the chi square test results obtained p value = 0.018 (p <0.05) which showed significant differences in patient outcomes as measured by the initial NIHSS score between the two hospitals.

Table 4. Comparison of Initial NIHSS Results in Patients treated at H Adam Malik General Hospital and Kesdam Bukit Barisan Hospital Medan

Hospital Care	Initial NIHSS			P value*
	Severe	Moderate	Mild	
Kesdam Bukit Barisan Hospital Medan	8 (36,4%)	8 (36,4%)	6 (27,3%)	0,018

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H Adam Malik General Hospital Medan	1 (4,5%)	8 (36,4%)	13 (59,1%)

**chi square*

Comparison of NIHSS on 14th Day Results in Patients treated at H Adam Malik General Hospital and Kesdam Bukit Barisan Hospital Medan

At the examination 14 days later, no significant difference was found in Kesdam Bukit Barisan Hospital Medan where 9 patients (40.9%) with severe clinical outcome were followed by 7 patients (31.8%) moderate and 6 patients (27.3%) mild category. Whereas in patients treated at H Adam Malik General Hospital, the majority of patients with 13 patients (59.1%) with mild clinical outcomes (<5), followed by 8 patients (36.4%) moderate (5-14) and only 1 patient (4.5%) with severe clinical outcome (> 15). With the chi square test results obtained p value = 0.011 (p <0.05) which showed differences indicating significant differences in patient outcomes as measured by the NIHSS on 14th day score between the two hospitals**.**

Table 5. Comparison of NIHSS on 14th Day Results in Patients treated at H Adam Malik General Hospital and Kesdam Bukit Barisan Hospital Medan

Hospital Care	NIHSS on 14th Day			P value*
	Severe	Moderate	Mild	
Kesdam Bukit Barisan Hospital Medan	9 (40,9%)	7 (31,8%)	6 (27,3%)	0,011
H Adam Malik General Hospital Medan	1 (4,5%)	8 (36,4%)	13 (59,1%)	

**chi square*

Discussion

Previous studies have shown that the prevalence of memory disorders varies from 23% to 55% in the 3 months after a stroke, ending with a decrease from 11% to 31% 1 year after episode stroke. Mild Cognitive Impairment / MCI causes a decrease in cognitive function that is greater in relation to the age and level of education of individuals, but does not affect the activities of daily life. After a stroke, the most prominent disturbance is the processing speed, attention, and executive function of the patient. Memory disorders are found in 20% -50% of stroke patients during the period after stroke diagnosis. In the study by Wang et al it appears that the rate of crude stroke incidence was 11.3 cases / 1,000 people per year with modified effects based on age, sex, and race showing the percentage of dichotomous age at age ≤70 years (66.4%) vs> 70 years (32.6%); female sex (57.4%) vs male (42.6%); white race (83.3%) vs non-white people (16.7%). Stroke patients experience significantly faster memory loss than patients with a history of stroke before the onset of stroke. This relationship was also evident in all age, sex and race subgroups in this study (p <0.04 for all comparisons). In addition, older stroke sufferers experienced a greater decline in memory function at stroke onset (−0.64 vs. −0.26 points, p <0.001) and faster annual functional decline after stroke (−0.15 vs. −0.07 points / year, p = 0.003) compared to those who were younger.[7,8]

In contrast to this study, the study by Surawan found that the number of male acute ischemic stroke patients (216, 53.9%) was greater than female patients (185, 46.1%), and the prevalence of impaired memory and dementia was higher (56.6 %) in patients without evaluation, followed by patients undergoing evaluation for three months (41.6%) and six months (38.2%). In addition, the two groups of patients in the study showed significant differences (P <0.05) in terms of age, education and type of stroke in which 85% of patients were not educated or only reached elementary school level. Research in Bandung showed that from a total of 91 samples, the incidence of ischemic stroke was more common in the 50-59 age group (38.46%) and most rarely in the younger age group. The highest prevalence of ischemic stroke in patients with primary school education compared with higher education levels, with the highest incidence of 40.66% at the elementary school level and the lowest incidence of 7.69% at the college level.[9,10]

In line with Surawan's study where based on previous disease history, there was no significant difference (P> 0.05) between stroke patients with and without memory and dementia disorders in relation to duration of hospital care, history of stroke, diabetes mellitus, transient ischemic attack, hypercholesterolemia and drug use. Meanwhile, risk factors that showed a significant effect (P <0.05) were atrial fibrillation and hypertension. In

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addition, significant differences were found (P <0.05) in diastolic blood pressure, total cholesterol levels, LDL cholesterol levels and electrocardiograms. Research by Nahrowi shows the highest prevalence of 76.92% in patients with hypertension, followed by smoking with 31.87%. The relationship between smoking and ischemic stroke has been proven and is associated with atherosclerosis with stenosis then followed by dyslipidemia with 16.48%. This may be due to an increase in high carbohydrate intake and a high-fat diet which in a decade can affect high serum triglycerides. The lowest prevalence is diabetes mellitus with a prevalence of 13.19%.[9,10]

MMSE scores can be predicted further impairment of cognitive function or improvement in cognitive function, correlation and regression analysis are performed using MMSE as a continuous scale, and afterwards categorize patients into MMSE scores of more than 27, between 27 and 24, or lower than 24. In the domain cognitive abnormal, moderate sensitivity level of 0.72 on the cut-off score of 27/28. At the 28/29 cut-off, sensitivity increased to 0.87 but its specificity decreased to 0.42. Research by Bour shows that an MMSE score of less than 27 may indicate substantial cognitive impairment and MMSE is quite sensitive in patients with mild cognitive impairment.[11]

Research by Champond shows the average total value of the CDT is 12/15 (SD = 3.13) using the Freedman system and 2/3 (SD = 0.94) using the MoCA scoring system. The inter-assessor agreement between the three assessors for the total score on the CDT uses the Freedman system with correlations: 0.976; 95% confidence interval, 0.95-0.99). The correlation between the two scoring systems is moderate (r = 0.66, p <0.01). The only significant correlation (p <0.01) between the two scoring systems and other predictor variables was weak (with pre-OHS and stroke severity) to moderate (with Orientation Test). Most screening tests, such as CDT, were originally developed for dementia screening and are now being examined as clinical markers to be used in stroke populations. The results showed that CDT within a week of being treated was significantly related to functional and cognitive outcomes one year after stroke including the patient's level of dependence and disability and normal reintegration. The finding that tests carried out in acute strokes can explain up to 17% of cognitive and functional impairment within one year that is clinically meaningful. Significant predictive value of CDT for long-term stroke outcomes is related to previous findings about dementia. CDT can significantly predict future diagnoses of dementia in samples over> 1.5 years. This finding suggests that CDT can also be used in stroke populations to predict long-term outcomes. The results of this study indicate that CDT can provide meaningful information about the potential level of functional independence and care needs in a stroke rehabilitation program.[12]

Research by Rejen showed patients with dementia had an average NIHSS score higher than 6 (greater disability during stroke) and a median Barthel index lower than 12 (greater dependence for daily life activities). Patients with cognitive impairment have a higher median NIHSS score (greater disability at stroke) and a lower Barthel index median (greater dependence on daily living activities), as in other studies. [13]

In this study it appeared that patients with acute stroke who were treated in the ward Kasdem Bukit Barisan Medan had significantly higher levels of cognitive impairment on all cognitive function parameters compared to patients treated with Adam Malik General Hospital Medan with stroke corner facilities. Compared to research by Nahrowi at Dr. Hospital Hasan Sadikin Bandung, the results of this study showed that the most common cognitive disorders in this study were memory (75.82%), followed by attention (64.84%), language (58.24%), visuospatial / executive (57.14 %), abstraction (52.57%), and the lowest is orientation (43.96%). In this study, the prevalence of subjects with dependence on others in the moderate to full category was 37.37%, and only 14.29% subjects were able to be independent. The results of the study by Kongsawasdi appear to be consistent with previous prognostic studies, where motor and leg motor abilities and age have been identified as potential predictors for functional outcomes in acute stroke patients. The study also found that foot and arm motor repair and older age were independent predictors of functional outcome for 6 months after onset (foot RR = 1.92, arm RR = 1.75, and age RR = 1.36; P <0 , 05). Improvement of upper limb function is a predictor for the domain of hand function and daily life activities (ADL), and lower limb motor function is a positive predictor for the domain of functional mobility.[10,14]

Conclusion

With the chi square test, it was found that there were significant differences in cognitive function as measured by MMSE and CDT scores between patients treated at the Haji Adam Malik Hospital in Medan corner corner and those treated in the Ward of Kesdam Bukit Barisan Hospital with p value = 0.012 (p <0 , 05) and p value = 0.004 (p <0.05), respectively. Then it was also found significant differences in patient outcome as measured by the initial NIHSS score and day 14 with p value = 0.018 (p <0.05) and p value = 0.011 (p <0.05), respectively.

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