ORIGINAL ARTICLE

The Difference of Barthel Index Score Based on Stroke Severity, Weakness Side, and Onset of Physiotherapy in Ischemic Stroke Patients at Atma Jaya Hospital

Agustina Novita Putri Soegiarto, Linda Suryakusuma, Jane Pelealu

Faculty of Medicine and Health Sciences of Atma Jaya Indonesian Catholic University
Department of Neurology, Faculty of Medicine and Health Sciences Indonesian Catholic University Atma Jaya
Department of Physical Medicine and Rehabilitation, Atma Jaya Hospital

ABSTRACT

Background: Stroke is the third cause of disability that can affect the Activity of Daily Living (ADL). Ischemic stroke had higher incidence compared to hemorrhagic strokes. Rehabilitation in the form of physiotherapy can reduce the level of ADL dependencies, that is be measured by Barthel Index Score. Stroke severity, weakness side, and physiotherapy onset can be factors that influence the success of physiotherapy to reducing the level of ADL dependencies.

Methods:A descriptive analytic study with a cross-sectional design in ischemic stroke patients using secondary data from the Stroke Registry and medical records at Atma Jaya Hospital for the period of January 2016 to December 2017. The data were analyzed using Chi-Square.

Results: Study on 110 subjects, consisted of 62 men(56.4%), aged divided by under of 58 years, and above of 58 years were 52(47.3%) and 58 (52.7%). While subjects divided by stroke severity, i.e. minor, moderate, moderate to severe, and severe; 44 (40%), 58 (52.7%), 5 (4.5%), and 3 (2.7%) respectively. There were 77 participants (70%) had right side weakness and 33 participants (30%) were left side weakness. The changes of Barthel Index of ADL score, were 73 (66.4%) improvement, 6 (5.5%) deterioration, and 31 (28.2%) remained. The study has shown relationship between severity of stroke (p=0.008), weakness side (p=0.000), and physiotherapy onset (p=0.039) with the changes of Barthel Indexscore after treatment.

Conclusion: There was a relationship between stroke severity, the weakness side of stroke, and physiotherapy onset with the better result of Barthel Index of ADL score after the physiotherapy.

Keywords: *Activity of Daily Living (ADL), Barthel Index, ischemic stroke, physiotherapy onset, stroke severity, Weakness side*

Correspondence Detail:
Agustina Novita Putri Soegiarto
Email: novitaputrisoegiarto@gmail.com
Faculty of Medicine and Health Sciences of Atma Jaya Indonesian Catholic University
Address: Jl. Pluit Raya No.2, Jakarta Utara 1444

INTRODUCTION

Stroke is the number one cause of death. It is known as a cerebral vascular accident, that is impeded blood supply to some part of the brain. There are two major types of stroke: Ischemic stroke and Hemorrhagic stroke. According to Riskesdas in 2013, stroke morbidity in Indonesia was 57.9%. Ischemic stroke events were higher compared to hemorrhagic strokes, which were 87% and 13% .[1-3]

Stroke is also the third cause of disability that can affect bodily functions and patient's Activity of Daily Living (ADL). Restoring the ability to increasing independencies of ADL is the main goal of treating stroke patients.[4] Rehabilitation is useful for maintaining and reducing ADL dependences.[5] An important component to reducing ADL dependences in stroke patients is the correction of mobility in the form of physiotherapy.[6] Study by Maiko Yagi has proven that ischemic stroke, men and elder age were more prevalence.[7] The evidence might cause by the men are more likely to be smokers, obese, alcohol drinker, as the risk factor of metabolic disease and stroke.[8] Previous study by Hedna has shown that left-hemispheric ischemic strokes were more prevalence than right-hemispheric, besides the incidence of large-vessel ischemic strokes was higher in the left middle cerebral artery.[9]

One of parameter to evaluated the level of AD is by Barthel Index. Barthel Index is also used to see the progress of stroke patient. [10]

Two goals in neural repair in stroke: increase the amount or duration of early plasticity, induce greater plasticity late in the disease. The time of neural repair can be determined by; acute (since onset to one month) that was the thrombolysis/ Recanalization processed for Neuroprotection, subacute (to three month) was the neural repair period, and chronic (more three month) was a period for specific and high detailed of molecular growth induces regenerative cellular niches, since these time out, the certain molecular signals could not prolong.[11]

The study has found the more intense and earlier of the physiotherapy management, the more improvement of the motor function and ability to perform ADL after stroke.[12]

There were several factors may influence the success of physiotherapy program to achieve the higher level of ADL that evaluated by the Barthel Index score, i.e. the severity of ischemic stroke, the side of weakness, and the onset of physiotherapy.

METHODS

This study was descriptive analytic study with cross-sectional design. The research data analyzed using SPSS version 20 for Windows. Data analysis was carried out with Chi-Square. The independent variables were stroke severity,

weakness side, and physiotherapy onset. Stroke severity category was categorized based on NIH Stroke Scale (NIHSS) score. The dependent variable was the level of ADL evaluated by the Barthel Index score. The study sample were ischemic stroke patients at Atma Jaya Hospital who hospitalized between 2016-2017.

RESULTS

The participants consisted of 110 people with 62 men (56.4%), divided by two groups of aged, ie. under and above 58 years were 52 (47.3%) and 58 (52.7%) subjects as seen in Table 1

Table 1. Demographic Characteristics

Characteristics	Respondent	
	n	%
Gender		
Men	62	56.4
Women	48	43.6
Age	Mean 58 (range 28-83)	
< 58 years old	52	47.3
≥ 58 years old	58	52.7

Based on stroke severity, participants with minor, moderate, moderate to severe and severe stroke were 44 (40%), 58 (52.7%), 5 (4.5%), and 3 (2.7%). There were 77 participants (70%) were right side weakness and others were left side weakness. The onset of very early physiotherapy was 103 participants (93.6%), early as many as 4 participants (3.6%), and late as 3 participants (2.7%). The level of ADL by Barthel Index score before the treatment showed the independent patient, mild, moderate, heavy, and total dependence were 14(12.7%), 39(35.5%), 20(18.2%), 18(16.4%), and 19(17.3%). While, Barthel Index score after the treatment showed the independent patient, mild, moderate, heavy, and total dependence were 22 (20%), 47 (42.7%), 15 (13.6%), 18 (7.3%), and 8 (7.3 %) that has shown in Table 2.

Table 2. Characteristics of the subjects

	n	Percentage (%)
Stroke Severity		
Minor	44	40
Moderate	58	52.7
Moderate to Severe	5	4.5
Severe	3	2.7
Weakness Side		
Right Side	77	70
Left Side	33	30
Onset of Physiotherapy		
Very Early	103	93.6
Early	4	3.6
Late	3	2.7
ADL Score Barthel Index before Physiotherapy Program		
Independent	14	12.7
Mild Dependence	39	35.5
Moderate Dependence	20	18.2
Heavy Dependence	18	16.4
Total Dependence	19	17.3
ADL Score Barthel Index after Physiotherapy Program		
Independent	22	20
Mild Dependence	47	42.7
Moderate Dependence	15	13.6
Heavy Dependence	18	16.4
Total Dependence	8	7.3
Total	**110**	**100**

Table 3 has showed the changes of ADL score of the Barthel Index, were 73 participants (66.4%) experienced improvement, 6 participants (5.5%) experienced deterioration, and 31 participants (28.2%) remained.

Table 3. Changes of ADL Score Barthel Index Before and After Physiotherapy

	n	Percentage (%)
Improvement	73	66.4
Deterioration	6	5.5
Remained	31	28.2
Total	110	100

Relationship between stroke severity and changes in level of ADL by Barthel index score analyzed by the Fisher Exact Test obtained p value of 0.008 ($p < 0.05$), this indicated a significant relationship between stroke severity and changes in the ADL Score in the Barthel Index before and after physiotherapy shown in Table 4.

Table 4. The Relationship between Stroke Severity with the Changes of ADL Score Barthel Index

	Improvement	Deterioration	Remained	Total	P
	n	n	n	n	value
No Stroke Symptoms	0	1	2	3	0.008
Minor Stroke	24	1	16	41	
Moderate Stroke	45	2	11	58	
Moderate to Severe Stroke	3	1	1	5	
Severe Stroke	1	1	1	3	

Relationship between weakness side and changes in ADL score Barthel index analyzed by Fisher's Exact Test obtained a p value of 0.000 ($p < 0.05$), indicates a significant relationship between the stroke side and changes in the Barthel Index score before and after physiotherapy as seen in Table 5.

Table 5. The Relationship between Weakness Side with the Changes of ADL Score Barthel Index

	Improvement	Deterioration	Remained	Total	P
	n	n	n	n	value
Right Side Weakness	69	1	7	77	0.000
Left Side Weakness	5	5	23	33	

Table 6 has shown a relationship between the onset physiotherapy with the changes in ADL scores Barthel index based on Fisher's Exact Test test with p value 0.039 ($p < 0.05$).

Table 6. The Relationship between the Onset of Physiotherapy with the Changes of ADL Score Barthel Index

	Improvement	Deterioration	Remained	Total	P
	n	n	n	n	value
Very Early (≤1 month)	71	4	28	103	0.039
Early (> 1 – 3 month)	1	1	2	4	
Late (> 3 month)	1	1	1	3	

DISCUSSION

The total participants with ischemic stroke were consisted of 110 people, with more than half were men with age ≥ 58 years. This data was in accordance with Maiko Yagi et al. which showed incident of ischemic stroke patients were higher in men as much as 61.8% and with an average age of 73 years.[7] It could be caused by men are more likely to be smokers, obese, alcohol drinker, etc. that were risk factor to got metabolic disease and disturbed the blood flow.[8]

The study has found that most patients had right-sided weaknesses of 70%, by ischemic on left hemisphere. These results were confirmed the study by Hedna, et al. that stated left-hemispheric ischemic strokes appear to be more frequent than their right-hemispheric counterparts. The incidence of large-vessel ischemic strokes is higher in the left middle cerebral artery distribution.[9]

There were improvements in Barthel Index score after physiotherapy. The earlier of subjects had physiotherapy program, the higher score of Barthel Index they got. This result study supported by evidence-based analysis that found more intense and earlier of physiotherapy would improve motor function and ability to perform ADL after stroke.[10,11]

The study result has found a relationship between the severity of stroke and changes in the ADL score of the Barthel Index after the physiotherapy. This result is reinforced by the research of Gert Kwakkel, et al. stating that the NIHSS score is related to the output of the Barthel ADL score, the lower the NIHSS score, the better the ADL score will be obtained in ischemic stroke patients with an accuracy rate of 72%. Which meant that lower NIHSS score/ lower severity of stroke, will result in better prognosis.[12]

Subjects with right side weakness had more improvement in Barthel Index sore after the physiotherapy ($p<0.05$), and there was a relationship between the weakness side and the improvement of the Barthel Index score. The result study supported the study by Priscilla Gracia, that has proven the patients with left-sided weakness have a worse balance than the right side, as a consequences was delayed of mobilization after stroke.[13] Otherwise, the results of this study were different from study by Atteya, that found the weakness of the right side was less likely to experience improvement, because of apraxia on the right side were affected the ability to perform ADL.[13]

This study has proven a relationship between the onset of physiotherapy and changes in the ADL level as seen in the Barthel Index score. This result was in line with the study by Bernhardt that has found the earlier physiotherapy to the stroke patient, would get the better prognosis of dependencies. Physiotherapy that starts in early onset has a success rate of 50% in ischemic stroke patients. Besides, study by Francesco et al. has proven that physiotherapy would provide a good output for ischemic stroke patients. The previous study supported the result of this study that all mild to moderate ischemic stroke. [11,15,16]

CONCLUSION

There was a relationship between stroke severity, the weakness side of stroke, and physiotherapy onset with the better result of Barthel Index of ADL score after the physiotherapy.

REFERENCES

1. Pataky Z, Armand S, Muller-Pinget S, Golay A and Allet L. Effects of Obesity on Functional Capacity. Obesity Journal. 2014; 22:56–62.
2. Depkes RI. Hasil Riset Kesehatan Dasar (Riskesdas). Jakarta: Depkes RI. 2013.
3. American Academy of Pediatrics. Active Healthy Living: Prevention of Childhood Obesity Through Increased Physical Activity. Pediatrics. 2006;117:1834-42.
4. Alton I. Chapter 7: The Overweight Adolescent. In: Stang J, Story M (eds) *Guidelines for Adolescent Nutrition Services. New York:* American Obesity Association. 2005; 77-91.
5. Anderson et al. Physical activity is low in obese New Zealand children and adolescents. Scientific Reports. 2017; 7:41822.
6. Rowland TW. Effect of Obesity on Cardiac Function in Children and Adolescents: A review. Journal of Sports Science and Medicine. 2007; 319-326.
7. U.S. Department of Health and Human Services. 2008 Physical Activity Guidelines for Americans. ODPHP Publication. 2008. Available at: www.health.gov/paguidelines.
8. Men and Stroke [Internet]. National Center for Chronic Disease Prevention and Health Promotion. [cited 20 December 2018]. Available from: https://www.cdc.gov/stroke/docs/Men_Stroke_Factsheet.pdf.
9. Hedna VS, Bodhit AN, Ansari S, et al. Hemispheric differences in ischemic stroke: is left-hemisphere stroke more common?. J Clin Neurol. 2013;9(2):97-102.
10. Sehatzadeh S. Effect of Increased Intensity of Physiotherapy on Patient Outcomes After Stroke: An Evidence-Based Analysis. Ont

Health Technol Assess Ser. 2015;15(6):1-42.
11. Martin EG, Barreto GE, Agundez JAG, Guedes RCA, El-Bacha RS. Cerebral Endothelial and Glial Cells are More Tan Bricks in The Great Wall of The Brain: Insights Into The Way The Blood Brain Barrier Actually Works Celebrating The Centenary of Goldman's Experemints. Nat Neurosci 13:1496. DOI 10.3389/978-2-88919-572-5.
12. Kwakkel G, Veerbeek JM, Erwin EH, Nijland R, Harmeling van der Wel BC, and Dippel DWJ. Predictive value of the NIHSS for ADL outcome after ischemic hemispheric streoke: Does timing of early assessment matter?. Journal of the Neurological Sciences. 2010;294(1):57-61.
13. Thompson WR, Gordon NF, Pescatello. ACSM's Guidelines for Exercise Testing and Prescription. Lippincot Williams & Wilkins. 2009; 8:1-11, 73,88,153-5, 188,253-8.
14. Li AM, Yin J, Au J, So H, Tsang T, Wong E. Standard Reference for the Six Minute Walking Test in Healthy Children Aged 7 to 16 Years. Am J Respir Crit Care Med. 2007; 176;174-80.
15. Richardson CR, Newton TL, Abraham JJ, Sen A, Jimbo M, Swartz AM. A Meta-Analysis of Pedometer-Based Walking Interventions and Weight Loss. Annals of Family Medicine. 2008; 6: 69-77.
16. Piniero JC, Ortega F, Keating X, Montesinos JG, Sjontorm M, Ruiz J. Precentile Values for Aerobic Performance Running / Walking Field Test in Children Aged 6 to 17 years; influenced of Weight Status. Nutr Hosp. 2011;26(3):572-8.