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Analysis Factors Associated with Functional Ability among Stroke Patients

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Abstract. Stroke is a neurological change and the primary cause of functional disorders. This study aimed to determine the factors associated with functional ability among stroke patients. A cross-sectional was applied in this study. The results showed there was a relationship between muscle strength and functional capacity among stroke patients. There were significant differences in the average value of functional skills in male and female stroke patients. There is no relationship between age and functional ability. There is no difference in the average functional ability in patients with ischemic and hemorrhagic strokes, stroke patients who have comorbidities and have no comorbidities and there is no difference in the functional skills of stroke patients who experience the first attack and repeat attacks

Keywords: factors associated, functional ability, stroke.

INTRODUCTION

Stroke is a neurological condition caused by blood circulation disorders in parts of the brain. It was due to a pathological process such as obstruction of blood flow, including hemorrhagic or blockage (ischemic stroke). This condition may impact three forms of a stroke attack, including healing correctly, heal with disabilities, or death (1).

American Heart Association (AHA) reported 700,000 people in the United States had been diagnosed as a stroke every year (2). In the current situation, around 4 million people in the United States have lived with physical limitations, and 15-30% of them were permanent disability (3). In Indonesia, the diagnosis of health workers estimated that in every 7 per mile were stroke (Health Research and Development Agency, 2013). While data from Dr. Soekardjo Tasikmalaya Hospital also showed the highest ranked first in the neurological ward were 652 cases in 2016.

The World Stroke Organization (WSO) explained that stroke was associated with loss of workdays and reduced quality of life, functional disorders (20%), and permanent disabilities (15-30%). This condition also affected not only patients alone but also family members as well as the economic burden for the health care system (4). A previous study reported that stroke patients with severe disability functional have difficulty with *activities of daily living* (ADL) and low level on their independence to perform activities (5). It may link on decreasing muscle strength and flexibility as well as joint stiffness (4).

Saltzman explained the functional status among stroke patients could be assessed through a functional assessment to determine the severity of illness, ability, and individual needs for care, monitor changes over time, as well as to monitor maintenance. Several measurements, including the functional status, are Katz Index, Kenny Self Care Index, The Index of Independence in Activities of Daily Living (ADL), Functional Independent Measure (FIM), Barthel Index (6).

Barthel Index is a standard instrument used to measure functional status among stroke patients. Stroke patients who experience paralysis in one or both members of the upper limb (hand) commonly have difficulties in physiological needs such as eating, bathing, and movement. Disability to perform meal among stroke patients affect not only the digestive system and energy but also decreased concentration or cognitive.

Although conceptually, almost all stroke patients experience obstacles in functional ability but found that some stroke patients can carry out their daily activities independently without decreasing functional ability. Fandri's study (5) showed that there are differences in the functional status of stroke patients when entering and leaving the hospital. Differences in functional status in stroke patients both when entering and leaving the hospital. Functional ability is an important thing that must be studied by nurses in determining interventions to be done. Conceptually, stroke patients will experience obstacles in carrying out daily activities. This will cause a change in their functional status.

Factors that cause changes in functional status need to be identified as the basis for conducting nursing care both in the restorative phase and as early as possible when the patient is admitted to the hospital due to a stroke. Factors related to functional status in stroke patients are identified from the concept of factors that affect the ability to do physical activity, general functional condition, and research on functional status in previous stroke patients. Factors that affect functional status include age, sex, type of stroke, admission time, frequency of attacks, comorbidities, and muscle strength. Various factors that are known to affect the functional abilities of stroke patients differ in each patient. Therefore, researchers are interested in conducting further research on the factors that affect the functional abilities of stroke patients

OBJECTIVE

The study aimed to determine the factors associated with functional ability among stroke patients.

METHOD

A cross-sectional study was applied in this study and conducted at Dr. Soekardjo Tasikmalaya Hospital. Sixty samples were selected using purposive sampling. The inclusion criteria of this study were were stroke patients treated in Room V of Dr. Soekardjo Tasikmalaya Hospital, be able to communicate Indonesia both verbal and written, willingness to participate in this study, and signed *informed consent.* Patients who have global aphasia and stroke patients in the progressive phase were excluded from this study.

The research instruments of this study were: 1) characteristics of respondents' instrument consisted of age, sex, type of stroke, *admission time*, frequency of attacks, and comorbidities; 2) the Barthel Index was used to assess muscle strength and functional abilities. Before conducting the study, the researcher explained the purpose of the study, benefits, and procedures of the study. Then, respondents who are willing to participate in this study, informed consent was signed.

RESULTS

Characteristic of respondents

Table 1 showed that more than half of the patients were male (65.3%). Nearly seventy percent of patients were diagnosed as ischemic. Most of them admit to the hospital after more than 6 hours (76.9%). About 82.7% of them have comorbidities during admit to the hospital. Most patients come to the hospital for the first attack of stroke (78.8%)

Table 1. Characteristic of respondents

VARIABLE		TOTAL%
Gender		
Male	34	65.3
Female	18	34.6
Stroke Type		
Ischemic	36	69.2
Haemorrhagic	16	30.7
Admission Time		
Less than 6 hours	12	23.1
More than 6 hours	40	76.9
Comorbidities		
Have	43	82.7
No have	9	17.3
Frequency of Attack		
First	41	78.8
Repeat	11	21.2
TOTAL	**52**	**100**

Mean difference of variables and its' effect on functional ability among stroke patients

Table 2 explained the mean difference of variables and its' effect on functional ability among stroke patients. The results showed that the only gender has a significant difference in functional ability among stroke patients. Four other variables, including stroke type, admission time, comorbidities, and frequency of attack, were not a significant difference.

Table 2. mean difference of variables and its' effect on functional ability among stroke patients

Variable	Mean	SD	SE	p-*Value*	N
Gender					
Male	78.41	14 238	2442	0.012	34
Women	68.89	8324	1,962		18
Stroke type					
Ischemic	74.64	13 385	2231	0.701	36
Haemorrhagic	76.19	13 263	3,316		16
Admission Time					
<6 hours	72.25	7617	2199	0.398	12
6 hours	75.98	14 473	2,288		40
Comorbidities					
Have	75.70	13 518	2,061	0.493	43
No have	72.33	12 124	4,041		9
Frequency of Attack					
First	75.61	13 234	2067	0.608	41
Repeat	73.27	13 719	4,137		11

DISCUSSION

Results showed an age average of respondents was 54.52 years. Age is a *known modifiable factor* for stroke. Age is one of the factors to increase the incidence of stroke (5). However, currently, most of the stroke patients were at a productive period. It was due to unhealthy lifestyles, such as smoking, drinking alcohol, diabetes mellitus, and foods high in fat and cholesterol. It was inconsistent with a study from Vika et al. (6), which stated that older people were significantly got stroke conditions since most of them have less body resistance and physical strength. It was due to a decrease the body function and lack of physical abilities. In this study, most of the patients were adults aged with good physical endurance and a lighter level of dependence. In contrast to elderly patients, they have experience obstacles in functional recovery due to mental state and adaptation.

The majority of respondents were male (65.3%). A study from Black & Hawk (5) mentioned that men were higher than women, whereas the mortality rate showed that women were lower than men in terms of stroke incidence. Although men are more vulnerable than women at a younger age, women will follow after they reach menopause. Another reason showed that Women also have a high enough risk of stroke if they are taking birth control pills, undergoing hormone replacement therapy, and pregnancy and childbirth. The risk of stroke is relatively high, six weeks postpartum. Changes in reproductive hormones that occur in women are a trigger factor (3).

The results of the subsequent analysis showed that there were significant differences in the average functional ability in men and women. This indicates that gender influences the functional ability of stroke patients. The results showed that men had better functional ability scores compared to women. This is in line with the results of research on the quality of life of stroke patients (7), which shows that women have more severe disability rates compared to men in the 12 months' post-stroke. The analysis shows that men have better strength in dealing with post-stroke conditions and better muscle strength so that it supports the fulfillment of daily needs. This is what causes the functional ability of male patients better than women. The results of research on race and gender differences in the severity of the stroke and the outcome of stroke patients show different results, where the results of this study indicate that both men and women have the same outcome in post-stroke functional abilities (7).

The results of the study showed that the majority of respondents had an ischemic stroke of 36 people (69.2%). Coronary stroke incidence is higher than hemorrhagic stroke. This is related to the increased incidence of vascular atherosclerosis that causes blockages in blood vessels, this blockage which then triggers a stroke (8). Ischemic stroke occurs due to impaired circulation of the blood vessels of the brain due to obstruction of blood vessel flow. Blockage can be caused by blood clots (thrombus) that form in a blood vessel of the brain or blood vessels of distal organs. In distal vascular thrombus, clots can be detached or may develop in an organ such as the heart and then carried through the arterial system to the brain as an embolus (9).

The results of the subsequent analysis showed that there was no significant difference in the average functional ability of respondents with ischemic stroke and hemorrhagic stroke (p-value = 0.701). A previous study (10) stated that the type of stroke is related to the level of disability and severity. Ischemic stroke occurs when a blood vessel that supplies blood to the brain is blocked. While hemorrhagic strokes, blood vessels rupture, obstructing normal blood flow and blood seeping into other parts of the brain and then damage. The effects caused by the two are different. Damage caused by a hemorrhagic stroke can be more severe because of the leakage of blood that comes out into the brain tissue with high blood pressure. This can cause death or severe disability.

The results of the study are different from what researchers get. The results showed no difference in functional abilities between patients who had ischemic and hemorrhagic strokes. This difference is likely due to the researchers conducting the study while the patient was still hospitalized and was still under the strict supervision of health workers. Further prognosis shows that hemorrhagic stroke does have a more severe level compared to ischemic stroke

The results showed that the majority of respondents came to the hospital for more than 6 hours after the attack (76.6%). A study conducted by Broadley & Thompson (2003) of 284 patients hospitalized with a stroke, 35% were treated within 4-6 hours of symptom onset, and 28% within two hours, while the rest were> 6 hours. Patients with severe strokes who have decreased consciousness and live in areas with easy access to the hospital tend to take care of the hospital more quickly. Time 3-6 hours (*golden period*) is an essential time for stroke management because this time has proven to be effective in restoring brain function and minimizing neuron damage after ischemic stroke. Therapy that has been proven effective in restoring brain function and reducing neuronal damage after ischemic stroke is one of which is the administration of tissue plasminogen activator therapy (TPA) given within 3 hours (9, 11-12). If in less than 6 hours, the patient comes to the hospital and gets TPA therapy, likely, the area around the infarction that is ischemic can still be maintained. Research shows that the initiation of TPA administration (3-6 hours) can reduce the size/degree of stroke and improve functional ability within three months (12).

The results of subsequent analyses showed that there was no significant difference in the average functional ability of respondents who came to the hospital less than 6 hours and more than 6 hours after the attack (p-value = 0.398). This is different from the concept described above, which shows that admission time has a significant influence on the return of brain function. Patients who come to the hospital in less than 6 hours will have a higher chance of having better functional abilities because they can be intervened more quickly to reduce the impact of decreased blood circulation to the brain. Meijer, AM (2016) shows that the time a stroke patient is taken to the hospital influences the patient's functional ability. The researcher's analysis of the results of this study did not affect because the standard of care and medical applied at the Tasikmalaya Hospital was still the same in dealing with stroke patients who came less than 6 hours after the attack and who after 6 hours after the attack. The provision of thrombolytic agents has not yet been given the various limitations in the source of funds and resources available in hospitals. Patients have been given standard care with the collaboration of doctors in administering neuroprotector drugs.

The results showed that the majority of respondents had comorbidities, including hypertension, hypercholesterolemia, and DM (82.7%). This hypertension condition is at risk of causing the rupture of blood vessels, which can ultimately cause a stroke. According to (13), the higher the blood pressure, the higher the possibility of a stroke, both non-hemorrhagic and hemorrhagic. Increased levels of cholesterol in the blood, especially LDL, are risk factors for atherosclerosis. In patients with diabetes, high blood sugar levels during a stroke will increase the likelihood of infarction spreading due to the formation of lactic acid due to anaerobic glucose metabolism, which damages brain tissue.

The results showed that there was no significant difference in functional ability among patients with comorbidities and no comorbidities (p-value = 0.493). A study showed patients who have severe diseases such as hypertension, DM, heart disease, and kidney disease tend to recover more slowly than those who don't have the condition (1). Another study explained that the complications of the disease caused the treatment not only to focus on a stroke so that it would affect the speed of healing and also if complications of the disease were not treated, but it could even worsen the state of stroke (6). In line with another study (14) states that patients with comorbidities such as diabetes mellitus is prone to become

atherosclerosis, hypertension, obesity, and blood lipid disorders. Someone who has diabetes has twice the risk of ischemic stroke compared to those who do not have diabetes, so that with shorter strokes, stroke repairs, the process of improving the patient's functional ability will be hampered. This complication condition indirectly affects the functional ability of the patient, so that the concept of patients with concomitant diseases will have a level of functional ability that is worse than patients without comorbidities. But this condition is not in line with the results of the study. Research shows that there is no difference in the functional abilities of patients who have comorbidities and those who do not have comorbidities. This is likely because respondents in this study continue to undergo stroke therapy and do exercises to improve their ability to do activities.

The results of the study showed that the majority of respondents came to the hospital with the first attack (78.8%). The results of a statistical survey conducted in the United States reveal that every year approximately 700 thousand people in America experience a stroke. Of that number, about 500 thousand were the first attacks, and 200 thousand were recurrent stroke (15).

The results of the subsequent analysis showed that there was no significant difference in the average functional ability of respondents who came to the hospital with the first attack and repeated tests (p-value = 0.608). Conceptually, a stroke with a second attack will have a worse impact on a patient's motor function, a second stroke, and the subsequent shows the patient's reduced ability to control stroke risk factors so that the patient's motor function will deteriorate too. This causes the patient's functional ability to be challenging to recover. This is different from the results of the study, which showed no difference in functional capacity in patients with first and repeated attacks. The analysis of researchers is likely this is due to proper management of motor skills training.

Results showed the average muscle strength of the respondents was 2.96. The most common long-term deficit in stroke patients is a decrease in muscle strength. This decrease in muscle strength is the most significant factor in reducing the independence of stroke patients. Good muscle strength can increase the ability of stroke patients to increase ADL compliance. Therefore, the role of nurses in the rehabilitation phase is critical to prevent complications and long-term disability. Rehabilitation is done to achieve and maintain the ability of patients to meet ADL

The results of the subsequent analysis showed that there was a significant relationship between muscle strength and functional ability (p-value = 0.0005). Muscle strength of stroke patients, which has decreased due to interference with the motor function, will cause patients to experience limitations inactivity. Therefore, stroke patients as early as possible are trained so that their muscle strength increases. With increased muscle strength, the ability of the patient's activity can be increased so that the patient can move independently. In was consistent with another study showed that patients reguler perform muscle strength through ROM exercises showed a better level of independence (16). Another study also showed that Patients who regular perform relaxation progressive muscle have normal clinical outcomes (17).

CONCLUSION

The results of this study indicate that the average age of respondents was 54.52 years, the average value of muscle strength was 2.96, and the average value of functional ability was 75.12. Most respondents were male (65.3%). Most of the respondents suffered from ischemic stroke (69.2%) when they came to the hospital; most were more than 6 hours (76.9%). Most respondents had comorbidities (82.7%); the majority of respondents were first-time patients

with attacks (78.8%). The results of the bivariate analysis showed that there was no relationship between age and functional ability values (r = 0.031), and there was a strong relationship between muscle strength and functional ability (r = 0.925). There was a significant difference in the average functional ability in men and women (p = 0.012), there was no significant difference in the average functional ability in respondents with ischemic stroke and hemorrhagic stroke (p = 0.701). There was no significant difference in the average functional ability of respondents who came to the hospital less than 6 hours and more than 6 hours after the attack (p = 0.398), there was no significant difference in the average functional ability of respondents who had comorbidities and did not have concomitant disease (p = 0.493), and there was no significant difference in the average functional ability of respondents with first stroke and retrial (p = 0.608)

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