

INTERVENTION OF ACCEPTANCE AND COMMITMENT THERAPY AND RANGE OF MOTION EXERCISE TO INCREASING MUSCLE STRENGTH IN NON-HEMORRHAGIC POST STROKE PATIENTS

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ABSTRACT

Background: The function of the brain is as the control center of every member of human movement, so the damage to the brain causes loss of brain function. Disturbances that occur in sensory and motor functions in stroke patients cause imbalance and difficulty walking due to disturbances in muscle strength, balance and coordination of movements. Motor neuron disorders with symptoms such as limb movement disorders, loss of voluntary movement control (conscious movement), limited muscle tone, and limited reflexes that can result in weakness and contractures for a long time which can result in paralysis of the upper extremities and lower extremities. **Objective:** Analyzing the effect of the combination of Acceptance and Commitment Therapy (ACT) intervention and Range of Motion on the improvement of motor function in non-hemorrhagic post stroke patients. **Method:** This study used a Quasy Experiment research method and used a pretest - posttest design with a control group design. 60 respondents were divided into 2 groups, the intervention group (n = 30) was given a combination of ACT and ROM while the control group (n = 30). Data analysis using Friedman. **Result:** shows that there is a significant difference in upper limb muscle strength with p value = 0,001 and lower limb muscle strength p value = 0,001 while the range of motion of the upper limb p value = 0,001 and the range of motion of the lower limb p value = 0,001. **Conclusion:** The combination of Acceptance and Commitment Therapy (ACT) and Range of Motion affects the improvement of motoric function in non-hemorrhagic post stroke patients

KEYWORD: Acceptance and Commitment Therapy (ACT), Range of Motion (ROM), Motor Functions Non-Hemorrhagic Post Stroke.

INTRODUCTION

Health problems that arise due to stroke vary widely, depending on the area of the brain that experiences infarction or tissue death and rupture of brain blood vessels which causes brain function disorders, and results in bleeding in the brain.^[1] The function of the brain is as the control center of every member of the human movement, so the damage to the brain causes loss of brain function itself.^[2] This condition can result in long-term disability which affects motor, sensory, cognitive, and psychological functions.^[3,4] Stroke is a syndrome characterized by loss of focal central nerve function due to blockage or rupture of brain blood vessels which has signs of a sudden attack and lasts for more than 24 hours which can cause disability to death.^[5]

Non-hemorrhagic stroke is a stroke that often occurs with an incidence of 80% of total stroke cases.^[6] Every year about 795,000 people have a stroke and about 610,000 of them are first attacks and 185,000 are recurrent strokes.^[7] Based on data from the World Health

Organization (WHO), globally, non-communicable diseases which are the number one cause of death each year are coronary heart disease, heart failure, hypertension and stroke. More than 17.9 million people die each year from cardiovascular disease and an estimated 31% of all deaths worldwide. More than 75% of deaths from cardiovascular disease occur in developing countries, and 85% of deaths occur due to heart attacks and strokes.^[8]

Stroke is the leading cause of death in Indonesia. Based on Riskesdas data (2018) stroke is the main cause of death in almost all hospitals in Indonesia with a prevalence of 7% in 2013 and increased to 10.9% in 2018. This figure is proportional to the total prevalence of stroke in all provinces in Indonesia. Indonesia based on the diagnosis of a doctor with a stroke in Indonesians aged > 15 years, it is 10.9%. The highest prevalence occurred in the province of East Kalimantan (14.7%) and the province of DI Yogyakarta (14.6%), followed by North Sulawesi with the number (14.2%). Meanwhile,

Central Sulawesi province was ranked 18th with the number (10.9%) of stroke sufferers.^[9]

Disturbances that occur in sensory and motor functions in stroke patients cause imbalance and difficulty walking due to disturbances in muscle strength, balance and coordination of movements.^[10] Motor neuron disorders with symptoms such as limb movement disorders, loss of voluntary movement control (conscious movement), limited muscle tone, and limited reflexes that can result in weakness and contractures for a long time which can result in paralysis of the upper extremities and lower extremities.^[11,12]

Stroke sufferers generally experience physical, cognitive and emotional problems. About 50 million stroke patients in the world experience physical, cognitive and emotional problems.^[13] Stroke patients experience disturbances in the fulfillment of daily activities because stroke patients have weak motor skills, especially in elderly patients.^[14] The decrease in activity in a study conducted by Pei on 152 respondents said that 8.6% of respondents had mild disabilities, 38.8% of respondents had moderate disabilities and 52.6% of respondents had severe disabilities after a stroke.^[14] As many as 80% of stroke patients return from health care facilities with various symptoms, such as hemiparesis, depression, dysarthria, dysphagia, aphasia, and others.^[15] Action is needed to prevent, treat and minimize complications that occur, either pharmacologically or by non-pharmacological approaches such as holistic care.

The early rehabilitation phase is carried out in order to go through the physical recovery process more quickly, optimally and avoid other organ disorders and disabilities that may occur due to stroke. Rehabilitation and recovery focuses on the patient's ability to improve motor function. Range of Motion (ROM) exercise is a form of exercise in the rehabilitation process that is considered effective enough to prevent disability in stroke patients so that the quality of life can improve. ROM is used to maintain a complete level of ability to move joints normally and completely to increase muscle mass and muscle tone. ROM exercises can be applied safely as a therapy in patients and have a positive impact both physically and psychologically.^[16]

ROM exercise is an action at the rehabilitation stage and is carried out in a hospital. This action needs to be continued at home after the patient is allowed to go home, which is carried out by the patient or family under the supervision of a nurse. Light exercises such as ROM are more effective because they are easier for patients to learn and remember, are easy to implement and are a low-cost nursing intervention that stroke survivors can implement at home.^[17] ROM exercises have a positive impact on increasing upper limb muscle strength in stroke patients.^[18] In addition, active ROM exercises that were performed 5 times a week for 3 weeks had a

significant effect on lower joint flexibility and motor movement in the elderly.^[19]

Acceptance and commitment therapy (ACT) is a more flexible and effective psychosocial problem intervention based on a functional analysis of the relationship between behavior and environment in handling various cases.^[20,21] Acceptance and commitment therapy (ACT) teaches individuals to accept disturbing and unpleasant thoughts by placing oneself in accordance with the values they believe in so that it is specially formulated to reduce traumatic and depression without avoiding past events with mechanisms that are used regularly. therapeutic.^[22,23] Acceptance and commitment therapy (ACT) aims to increase psychological flexibility that refers to receive difficult and unwelcome thoughts or emotions yang in line with these individual values and belief principles which can be motivating and important to someone.^[24] So that clients can be invited not to avoid their life goals. ACT is able to help individuals with a wide range of problems, such as habit pattern disorders, anxiety disorders, addictive substance disorders, and PTSD.^[24,25]

Acceptance and commitment therapy (ACT) has a significant effect on client self-efficacy with long treatment times. The results showed that ACT which was carried out twice a week with a duration of 45-60 minutes had an impact on the level of anxiety and self-efficacy in patients undergoing hemodialysis. Acceptance and commitment therapy (ACT) simultaneously give effect to changes in anxiety by 25% and change self-efficacy by 25.5% on patients undergoing hemodialysis.^[26]

The application of ACT can improve the patient's ability to accept their health conditions, and can make decisions in choosing commitments to make to prevent recurrence.^[27] ACT helps patients understand more basic problems experienced, thoughts, emotions and behavioral impacts that arise, personal values to accept all experiences. Individuals who accept their conditions find it easier to build commitments in improving their health conditions. Acceptance indicates that a person understands and agrees with the circumstances they are experiencing, whether they are pleasant or sad. Individuals must be committed to their values so that they can understand what must be done and individuals must be able to survive with what they have chosen because they have made a commitment.^[28]

The phenomenon and some of the above studies show the importance of physical and psychological treatment in stroke patients, previous research on ROM mostly only focused on physical treatment so that psychological treatment of patients is needed to be able to meet the patient's needs comprehensively, researchers want to combine it with psychological treatment that can be provided. to increase commitment in ROM exercises, namely ACT which helps patients to accept disturbing

and unpleasant thoughts by placing themselves according to their values and committing themselves to post-stroke rehabilitation therapy.

METHOD

This study used a Quasy Experiment research method and used a pretest - posttest design with a control group design. In this study, researchers conducted interventions in the form of acceptance and commitment therapy and Range of Motion exercises. Assessment of muscle strength can be done using the Medical Research Council scale.

Population and Samples

The population in this study were all non-hemorrhagic stroke patients treated at Anutapura Hospital, Palu and Madani Hospital, Central Sulawesi. The sample in this study were 60. So that the sample size is 30 people for the intervention group and 30 for the control group. This study emphasizes research ethics issues, including Informed Consent, Privacy and Dignity, Confidentiality, Justice, Ethical Clearance.^[29]

The sampling method used in this study was purposive sampling, namely sampling based on certain considerations made by the researcher himself, which

included subjects who met the inclusion and exclusion criteria as follows:^[30]

a. Inclusion criteria

1. Non hemorrhagic stroke patients with impaired motor function with an MRC score of at least 1 (muscle weakness)
2. Patients with an age range of 30-60 years
3. Patients with a full level of consciousness (GCS 13-15)
4. The patient's family agrees that the patient is willing to become a respondent by signing the research consent sheet (informed consent)

b. Exclusion criteria

1. Patients who have decreased consciousness
2. Patients who are on a ventilator
3. Patients who have severe complications
4. Hearing loss patients

RESULTS

Respondent Characteristics

The description of the characteristics of respondents based on age, gender, education level and stroke frequency is shown in table 1.

Table 1: Characteristics of Respondents Based on Age, Gender, Education and Stroke Frequency in the Intervention and Control Groups.

Characteristics	Group				p
	Intervention (n = 30)		Control (n = 30)		
	f	%	f	%	
<i>Age</i>					0.642
0-40	4	13.3	7	18.3	
1-50	12	40.0	11	38.3	
1-60	14	46.7	12	43.4	
Total	30	100	30	100	
<i>Gender</i>					1,000
Male	17	56.7	17	56.7	
Women	13	43.3	13	43.3	
Total	30	100	30	100	
<i>Level of education</i>					0.144
Primary School	1	3,3	1	3,3	
Middle School	4	13.3	7	23.3	
High school	12	40.0	19	63.3	
Undergraduate	13	43.3	3	10.0	
Total	30	100	30	100	
<i>Stroke Frequency</i>					0.358
First Strike	28	93.3	27	10.0	
Second Strike	2	6,7	3	90.0	
Total	30	100	30	100	

Motor Functions**Table 2: Analysis of Differences in Upper Limb Muscle Strength Before and After Treatment in the Intervention Group and the Control Group.**

Respondent Group	Measurement	Mean ± SD	p *
Intervention	Pre	1.80 ± 0.407	0.001
	Post Test 1	3.07 ± 0.365	
	Post Test 2	4.30 ± 0.535	
Control	Pre	1.33 ± 0.479	0.001
	Post Test 1	2.33 ± 0.479	
	Post Test 2	2.67 ± 0.479	

*Friedman Test

Table 3: Analysis of Differences in Lower Extremity Muscle Strength Before and After Treatment in the Intervention and Control Groups.

Respondent Group	Measurement	Mean ± SD	p *
Intervention	Pre	1.67 ± 0.479	0.001
	Post Test 1	3.17 ± 0.531	
	Post Test 2	4.07 ± 0.583	
Control	Pre	1.20 ± 0.407	0.001
	Post Test 1	2.20 ± 0.407	
	Post Test 2	2.60 ± 0.498	

* Friedman Test

DISCUSSION

The results showed that the average age of the majority of respondents who had a stroke in the intervention group was 14 people aged 51-60 years (46.7%). The youngest is 37 years old and the oldest is 60 years old. Respondents aged 37 years have a history of hypertension since 23 years and obesity, namely 81 with height 162.

Researchers argue that ages 51-60 are more likely to experience physical changes and psychological problems, physical changes show that individuals are more prone to experience pain due to weakness in overall body functions, including the flexibility of blood vessels that experience structural functional changes in the walls of blood vessels due to plaque buildup that lasts for years. - years resulting in obstruction of blood flow to the brain due to blockage so that the blood supply to the brain decreases and causes malfunctioning due to lack of oxygen supply. In the elderly, paralysis or hemiparase in the extremities makes individuals feel inferior, embarrassed, increased anxiety and avoidance behavior and decreased confidence to recover.

This study is in line with the research conducted by Arsyta, increasing age is a serious risk factor for diseases affecting blood vessels that experience changes in the function of the presence of large basic vessels such as the central aorta and carotid arteries which have an elastic nature which will experience changes in endothelial function due to accumulation of substances - collagen substance in the muscle layer of blood vessels which results in narrowing of the blood vessels.^[31] Other studies also argue that at the age of 51-60 they experience physical changes more often which make

individuals more susceptible to illness so that the need for self-efficacy education in trying to solve problems with the aim of changing their health.^[32]

The results showed that for the gender between the intervention group and the control group there was a similarity, where in the intervention group the male was 56.7% while the female was 43.3%.

Ischemic stroke caused by a blockage that often occurs in men with adult to elderly age, problems that occur suddenly without any symptoms are felt, within a few days of improvement and can recur without proper and prompt treatment of the primary disease. Risk factors for stroke in women at menopausal age, women who experience menopause naturally at the age of 42 years, the use of the hormones estrogen and progesterone increases the risk of postmenopausal stroke and low dose estrogen oral contraceptives increase the risk of ischemic stroke by 93%.^[33]

The results of this study found that the distribution of education levels showed that respondents graduated from Primary School as much as 3.3%, Middle School 13.3%. High School 40.0% and Undergraduate 43.3%. Someone's education is very important in solving problems. Researchers argue that the level of education affects a person's behavior.

This is in line with other research, education is an indicator of a person taking formal education and affects the ability to process information and the higher the level of awareness for healthy behavior. So that highly educated individuals have better self-efficacy.^[32]

The results showed that based on the frequency there was a difference in the number of characteristics of the respondents. In the intervention group 93.3% were first attack strokes, in the control group 7.8% were first attack respondents. In this study there were 5 respondents with repeated strokes. According to researchers, second or repeated stroke have a higher mortality and disability rate than first-time stroke, this is because brain tissue has not yet recovered from the first attack and will have a heavier impact. The results of this study indicate that most of the respondents were cases with the first attack. This condition is good for the patient's healing process. The first stroke of attack, if handled properly, will give optimal results.

The results of the combination ACT and ROM study were effective with a significant value in improving motor function in the intervention group, namely upper limb muscle strength which had a mean value of 4.17 ($p = 0.001$) indicating an increase in upper limb muscle strength compared to the control group with a mean value of 2.67 ($p = 0.001$). Lower limb muscle strength in the intervention group with an increase in the mean value of 4.07 ($p = 0.001$) while the control group was 2.60 ($p = 0.001$).

Range Of Motion (ROM) is an exercise performed to maintain or improve the level of perfection in the ability to move joints normally and completely to increase muscle mass and muscle tone aimed at increasing or maintaining muscle flexibility and strength, maintaining heart and respiratory function, preventing contractures and stiffness in joints.^[34] ROM exercises can cause stimulation thereby increasing the activity of neuromuscular and muscular chemicals. Neuromuscular stimulation will increase the stimulation of the nerve fibers of the limb muscles, especially the paasymatic nerves, which stimulate acetylcholine production, resulting in contraction.

This study is in line with the Hardwick study with interventions giving ROM exercises to be effective in increasing muscle strength and improving muscle tone, preventing joint stiffness and improving blood circulation in limb members.^[35]

Motor deficit is an effect similar to stroke, in the form of hemiparesis (weakness) and hemiplegia (paralysis). This is due to disturbance of motor neurons in the pyramidal pathway. Its characteristics are loss of control over volunteer movements (akinsia), impaired movement integrity, limited muscle tone and reflex limitations. The occurrence of hyporeflexia that changes rapidly to hyperreflexia in most patients to motor movements. So that with the change in mobilization in stroke sufferers and experiencing a decline in activities such as weakness in moving the legs, weakness in moving hands, inability to speak and other motor function disabilities.^[34] The mechanism through the muscles, especially the smooth muscles of the extremities, will increase metabolism in

the metachonderia to produce ATP which is used by the muscles of the extremities as energy for contraction and increase smooth muscle tone in the extremities.^[34] Muscle strength is closely related to the neuromuscular system, namely how much the ability of the nervous system to activate muscles to contract. improve muscle tone, and improve muscle tolerance for exercise, as well as prevent joint stiffness and improve blood circulation so that the more muscle fibers are activated, the greater the strength produced by these muscles.^[36]

The results of this study are in line with the research conducted by Oliviani which measured the muscle strength of the extremities of stroke patients who were given for 7 days with a frequency of 2x a day in 10 minutes, there was an increase in the average muscle strength before being given the intervention and after giving the intervention and supported by research from Mohamat which measured The limb range of motion of stroke patients given for 2 weeks with a frequency of 2x a day for 15 minutes showed that ROM exercises decreased the range of motion of the upper limb joints in stroke patients.^[18]

ACT is a therapy to increase psychological flexibility, namely the ability to make total contact with the present and be able to behave in accordance with the values of life. The application of ACT can improve the patient's ability to accept their health conditions, and can make decisions in choosing commitments to make to prevent recurrence.^[26] ACT therapy aims to help individuals accept their situation and events that make them behave positively about the conditions experienced after a stroke and directing the mind not to be ashamed of the various changes in his body, increasing motivation to recover so that individuals are able to commit to changing behavior to better prevent recurrent strokes.^[26]

Through the application of ACT, patients with physical limitations will accept their condition and can determine what is best for themselves and commit to doing what they choose. Giving ACT consists of several series of activities from relaxation and psychoeducation. When the patient manages to find value in his life, it will improve the process of acceptance and make peace with his situation as a key factor in psychological health.^[37]

These results are in line with Wahyuni's research on hemodialysis patients with acceptance and commitment therapy interventions who have high self-efficacy to overcome stress and obstacles to healthy behavior. Increasing perceptions of self-efficacy has positive effects on individual behavioral health, motivation, thinking styles, and emotional state of health. Self-efficacy as a framework for understanding compliance in healthy behavior and influencing human ability to cope with or control stressors which can affect the level of anxiety in him.^[10]

In the intervention group, the results obtained from the second meeting to the fourth meeting that the respondents were invited to identify problems, understand how problems arise, identify their own potential to deal with these problems and respondents were taught several techniques both with distraction and relaxation methods to alleviate psychological and physical burdens. Relaxation methods with light exercise such as ROM exercises and deep breathing exercises have an impact on improving motor function and feeling relaxed in individuals. Accumulatively, these two methods produce calm, fitness, health and endurance against stress. So that the reduction of negative perceptions caused by stress and increasing individual self-efficacy has a positive effect on the health of individual behavior, motivation, thinking style, and emotional health.^[38]

These activities greatly support the achievement of post-stroke adaptation and recovery.^[39] Patients who are able to independently meet their daily needs are free from psychosocial problems. Through the application of ACT, patients with physical limitations will accept their condition and can determine what is best for themselves and commit to doing what they choose. Giving ACT consists of several series of activities from relaxation and psychoeducation. When the patient manages to find value in his life, it will improve the process of acceptance and make peace with his situation as a key factor in psychological health.^[37]

The results of this study are supported by previous research conducted by Mc Cracken on acceptance and commitment therapy showing that a person experiencing chronic pain and being given ACT is able to reduce depression, anxiety and increase individual coping mechanisms while undergoing rehabilitation treatment.^[40]

ACT therapy is able to build an optimistic attitude and focus their thoughts on positive things such as light exercise (ROM) which has an impact on improving motor function, so it is appropriate to be given to individuals who experience non-hemorrhagic post stroke disease. According to Pujiastuti Psychoeducation can improve the patient's ability to cope with psychological problems related to physical problems.^[41] The psychological condition occurs because the patient's refusal occurs because he feels he is experiencing physical changes / disabilities. ACT therapy aims to be able to see the subject as it is so that there is openness to the subject. Subjects can analyze experiences and how subjects cope with them. Subjects' assessments of short and long term successes indicated their analysis of how subjects avoided more, let go, surrendered, remained silent and withdrew.^[27]

CONCLUSION

Intervention Acceptance and Commitment Therapy by administering 2 times in 5 days and Range of Motion

exercises with administration of 2x a day with a duration of 30 minutes for 4 days are effective in improving motor function in patients in post-hemorrhagic post-stroke recovery.

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