COMPARE THE EFFECTIVENESS OF CONSTRAINT INDUCED MOVEMENT THERAPY AND MOTOR RELEARNING PROGRAMME IN POST STROKE PATIENTS

Jerry Maratis[1], Ahmad Wahidin[2], Kesit Ivanali[3]

[1,2,3]Faculty of Physioterapy, Universias Esa Unggul, Jakarta, Indonesia

jerry.maratis@esaunggul.ac.id

Abstract

Objective: Compare the effectiveness of Constraint Induced Movement Therapy (CIMT) and Motor Relearning Program (MRP) on upper extremity and hand functions in post-stroke patients.. **Methods:** This research is an experimental study design. randomaized control pre test post-Test Design. Sample of convenience of twelve (12) stroke subjects are selected and devided into group I and group II. Group I received CIMT and group II with MRP. **Results:** test normality with Shapiro Wilk Test obtained normal distribution data while with test homogenity with Levene's test obtained data has variant Homogen. The results of hypothesis testing in treatment group I with the One Sampels T-test obtained p-value <0.001 in Wolf Motor Function Test (WMFT) CIMT intervention can improve Upper Etremity function. In the treatment group II with the One Sampels T-test, the p-value was <0.001 at WMFT. So it can be concluded that MRP intervention can improve Upper Extremity function. The independent sample t-test results show a p-value <0.360, which means there is no difference in the functional increase in Upper Extremity Stroke conditions between CIMT and MRP interventions. **Conclusion:** there was no difference in effectiveness between CIMT and MRP for improving upper extremity function in post-stroke patients.

Keywords: CIMT; MRP; Upper Extremity; Stroke.

Introduction

Stroke is a major health problem for modern society today. Stroke is increasingly becoming a serious problem faced by almost all over the world. In the past, strokes only began to occur at the age of 60 years, but now starting at the age of 40, a person already has a risk of stroke. The increase in stroke patients at a young age is due to a lifestyle, especially a high-cholesterol diet. Based on various hospitals, strokes in productive age often occur due to busy work and lack of exercise, lack of sleep, and severe stress which are also contributing factors (1). According to the results of Basic Health Research (RISKESDAS) in 2018, non-communicable diseases in Indonesia increased compared to 2013. The increase in people with cancer, stroke, chronic kidney disease, diabetes, and hypertension rose significantly. When compared with the results of research in 2013, the prevalence of cancer increased from 1.4% to 1.8%, stroke patients from 7% to 10.9%, chronic

kidney disease increased from 2% to 3.8%. This can happen because of an increasingly bad lifestyle, such as consuming alcohol, more smokers, infrequent physical activity, poor diet, and others (2). To answer these health challenges, optimal treatment is needed specifically and involves various disciplines including physiotherapy. The role of physiotherapy is very much needed to help with movement problems and functional activities in stroke patients (3). According to the WCPT (Word Confederation for Physical Therapy), physiotherapy is a health care provider that provides services to individuals and groups to develop, maintain and restore maximum movement and functional abilities throughout life. This includes providing services in circumstances where movement and function are threatened by aging, injury, illness, disease, disorder, condition or environmental factors. One of the factors that causes stroke patients to become dependent on other people and become independent in meeting their needs in carrying out daily activities, including the limited upper extremity function that experiences weakness due to the central nervous neurological lesions they experience (4). Various approaches to physiotherapy techniques and methods are increasingly developing in an effort to increase the functional activity of stroke patients, including the CIMT and MRP exercises. Both have a scientific basis that is still being developed by doctors and physiotherapists who concentrate on clinical treatment for stroke patients to restore physical capacity and functional abilities including the upper extremity (5). CIMT exercise is one of the exercises in the implementation of post-stroke patients, where in CIMT patients are required to use the side of the hand that is sick or has weakness when carrying out therapy programs and daily activities, while Those who are healthy or who are not incapacitated are intentionally restrained or forced not to be used to move around in carrying out their daily activities. Included in stabilizing objects except when resting (6). MRP is a specific program to retrain specific motor control by avoiding unnecessary or incorrect movements and involving cognitive processes and the application of locomotion. The MRP was developed by Janet H. Carr and Roberta Shepherd, two physiotherapists from Australia in the 1980s. The MRP is currently the most popular stroke approach technique in Australia, in addition to the bobath approach. This approach from the MRP emphasizes task-oriented training and providing appropriate feedback to patients to improve motor control in daily functional activities (7). The concept of motor learning in stroke patients with the MRP aims to help stroke patients move in functional activities with normal movement patterns, help achieve or perform active movements automatically, provide repetition so that normal patterns of behavior can be learned, and train patients. stroke in a number of varying conditions so that skills can be transferred to different situations and environments (8).

In measuring the functional ability of the upper extremity, this study uses the WMFT which is a standardized test for laboratory assessment. The test consists of two strength and 15 tasks that vary in time from shoulder to finger movements. Subjects who cannot perform the task within 2 minutes are given a maximum score of 120 seconds. The value

of each task is given a score of 6 points for functional ability. In this study an average of 15 tasks in time was used as a parameter test. The results of the functional ability scale for 15 tasks are also reported. The reliability and validity of the instrument was ensured due to the Highly Recommend in different stroke populations. Based on the description of the background, the authors feel the need to conduct a study entitled "Compare The Effectiveness of Constraint Induced Movement Therapy and Motor Relearning Program in post-stroke patients". The research conducted by the author is applied to patients with the same condition, namely post-stroke patients and will assess with WMFT how the effectiveness of improving upper extremity function abilities who experience weakness or functional limitations from both exercise groups.

Methods

This research method is experimental to see the comparison of CIMT with MRP in the upper extremity in increasing the ability of upper extremity functional activity in stroke patients by using a randomized control pre-post test design. This study was conducted to determine the comparison of CIMT with MRP in the upper extremity in increasing the ability of upper extremity functional activity in stroke patients, which then from the results of the intervention will know which exercise will be better. The research sample was divided into 2 groups, in which treatment group 1 would be given CIMT while treatment group 2 would be given MRP for the upper extremity. Both groups will be evaluated using WMFT. The sampling technique is carried out based on certain considerations, in accordance with the criteria established based on the variables studied, so that the researcher uses a sampling technique, namely the purposive sampling technique, by selecting samples that represent the criteria set in this study by obtaining samples that truly represent a population. So that the number of respondents in the treatment group 1 CIMT while the treatment group 2 will be given MRP to 12 samples. Criteria for acceptance and rejection Acceptance Criteria Boy and girl Patients after the first attack stroke recovery phase 40-60 years old Clinical examination results <14 based on NIHSS Cognitive examination result >18 on MMSE Ashworth measurement degree 1-2 There is interference in the upper extremity both right and left Patient willing to get physiotherapy intervention for 4 weeks Rejection Criteria Have another neurological disorder, such as Parkinson's Stroke patients with complications of contractures, heart disease, cognitive impairment, vision and hearing Currently pursuing other research Drop out criteria The subject is unable to complete the exercise program according to the plan and exercise program that has been found Not routinely perform therapy as prescribed. The subject did not carry out the research procedure properly according to the direction of the researcher Declare fallback as a sample.

Results And Discussion

In this study, there were 12 samples who were willing to participate in the research program "Compare The Effectiveness of Constraint Induced Movement Therapy and Motor Learning Program in Post-Stroke Patients". The research took place for 4 weeks on 29 October - 29 November 2020 which was carried out in the North Kembangan area. The sampling method in this study was a randomized control pre-post test design.

Table 1: Distribution of Samples by Age

Age	TREATMENT GROUP 1		TREATMENT GROUP II	
	TOTAL	%	TOTAL	%
41-50	3	50	4	66,6
51-60	3	50	2	33,4
Total	6	100	6	100

Source: Personal Data

Table 2:Distribution of Samples by Gender

Gender	TREATMENT GROUP 1		TREATMENT GROUP II	
	TOTAL	%	TOTAL	%
Male	4	66,6	3	50
Female	2	33,4	3	50

Source: Personal Data

Table 3: Distribution of Samples Based on Stroke Classification

Stroke Classification	TREATMENT GROUP 1		TREATMENT GROUP II	
	TOTAL	%	TOTAL	%
Ischemic	6	100	6	100
Haemorhagic	0	0	0	0
Total	6	100	6	100

Source: Personal Data

Table 4: The Value of the WMFT Measurement Results inThe Treatment Group I

	Sample	WMFT Measurement		
		Before	After	Difference
Treatment Group I	1	54	59	5
	2	49	55	6
	3	53	58	5
	4	60	64	4
	5	59	64	5
	6	45	48	3
	Mean	53,33	58	4,67
	SD	5,75	6,03	1,03

Table 5: The Value of the WMFT Measurement Results inThe Treatment Group II

		WMFT Measurement		
	Sample	Before	After	Difference
Treatment Group II	1	50	55	5
	2	47	51	4
	3	63	66	3
	4	54	59	5
	5	59	63	4
	6	55	59	4
	Mean	54,67	58,83	4,17
	SD	3,53	2,83	0,75

Table 6: Normality Test Results

Variable	*Shapiro Wilk Test*	
	Treatment Group I	Treatment Group II
Before	0,749	0,966
After	0,468	0,931
Difference	0,473	0,212

Table 7: Homogeneity Test Results

Variable	Homogeneity Test
Before Treatment Group I Before Treatment Group II	0,475

Table 8: Hypothesis Test Results 1

Data	Mean	SD	*P*
Before	53,33	5,75	0,001
After	58	6,03	

Table 9: Hypothesis Test Results 2

Data	Mean	SD	*P*
Before	54,67	3,53	0,001
After	58,83	2,82	

Table 10: Hypothesis Test Results 3

Data	Mean	SD	*P*
Difference I	4,67	1,03	0,360
Difference II	4,16	0,75	

Discussion

Based on the findings in the field of this study, the sample was based on age that the sample in treatment group 1 consisted of 3 people aged 41-50 years (50%), 3 people aged 51-50 years (50%). While in treatment group 2, there were 4 people aged 41-50 years (66.6%), 2 people aged 51-60 years (33.4%). Thus, the average people affected by the stroke above are grouped into one group, namely the age of 41-50 years (65%) while those at the age of 51-60 years (45%). This is in contrast to previous findings by Charlotte et. Al (2010) "incidence, case fatality, and functional outcome of intracerebral haemorrhage over time, according to age, sex, and ethnic origin: a systematic review and meta-analysis" in this study they collected articles from January 1980 to November 2009 where the highest age affected by stroke was at the age of 75-84 years, namely 665 cases, while at the age <44 years. 119 cases, age 45-54 years 164 cases, age 55-64 years 305 cases. Based on the gender sample found during the study, the samples in the treatment group 1 were male as many as 4 people (66.4%) and female as many as 2 people (33.4%), while in the treatment group 2 were male. as many as 3 people (50%) and 3 women (50%). This is in contrast to the previous study by Vanja Basic et.al (2016) "Age and Gander Differences Acute Stroke Hospital" (Zavoreo, Lisak and Matovina, 2016). They researched in hospitals in Croatia, women tend to be found more than men. There were 210 female patients found in the hospital, of which 33 cases were caused by hemorrhagic stroke and 177 cases due to ischemic stroke. Whereas in men, there were 186 patients, 22 cases due to hemorrhagic stroke and 164 cases due to ischemic stroke. Based on the findings in the field, this study was stroke based on sample data according to the classification of stroke in the treatment group I, all samples who had an ischemic stroke were 6 people (100%). And the treatment group II also experienced the same thing, namely all samples who experienced ischemic stroke, amounting to 6 people (100%). The results of this study were carried out by Salim Harris et al (2018) "TOAST Subtypes of Ischemic Stroke and Its Risk Factors: A Hospital – Based Studyat Cipto Mangunkusumo Hospital, Indonesia" the most common cause of ischemic stroke in his study was the blockage of atherosclerosis in the large arteries. And there are differences in risk factors between stroke subtypes. They found that diabetes was significantly associated with

atherosclerosis of large arteries leading to blockage, whereas hypertension was associated with small blood vessels. After obtaining the research results through a series of requirements analysis tests and hypothesis testing, the results of this study will answer and discuss the hypotheses that have been previously asked. The test requirements obtained are that the sample of treatment group 1 is normal and the sample of treatment group 2 is normal, from the two data it means that hypothesis testing uses parametric statistical tests, namely hypothesis testing 1 and hypothesis testing 2 with One Sample test and hypothesis testing 3 using Independent t -test.

The results of this study will answer the hypothesis contained in the previous chapter with the following explanation:

1. Hypothesis 1: "CIMT intervention can improve the ability of upper extremity functional activity in post-stroke patients" To test hypothesis 1 using the One Sample test in treatment group 1, which amounted to 6 people with CIMT intervention to improve the ability of functional activities. The WMFT values in table 4.4 were obtained at the beginning of the measurement before giving CIMT the mean value was 53.33 and SD 5.75, then after being given CIMT for 4 weeks the mean value became 58 with SD 6.03 then tested with the One Sample Test test in treatment group 1 with a P value of 0.001 where P <0.05 which means Ha is accepted, so it can be concluded that there is an increase in the ability of functional activities in post-stroke patients with CIMT administration. This happens because in CIMT there are two possible motor mechanisms that can improve, the first with a direct effect on the direct pathway, namely increasing cortical stimulation in the non-dominant hemisphere through increased use of the non-dominant hand which will improve motor function. Second, the indirect effect (indirect pathway) is an increase in the stimulus from a decrease in stimulation in the dominant hemisphere. And also with the principle of repetitive CIMT, as we already know the concept of neuroplasticity in stroke recovery, the more often you perform a movement, the more brain power is mobilized for that activity. The basis of all stroke recovery is neuroplasticity (9). This research was previously conducted by Kwakkel et al (2015) "Constraint-Induced Movement Therapy After Stroke. Where in the provision of this exercise found that there was an increase in functional activity in poststroke patients thus strengthening the authors in this study. The highest WMFT value in the treatment group I before being given exercise was achieved by sample

number 4 with a value of 60 while the lowest value was achieved by sample number 6 with a value of 45. After being given CIMT for 12 times the highest value was achieved by sample number 2 with a value of 55 where before receiving the intervention only got a value of 49, while the lowest value was achieved by sample number 6 with a change value of only 48 where previously it got a value of 45. The increase that occurred in sample number 2 was seen from the patient's understanding to carry out the tasks given and run well and the sample underwent intervention with discipline in carrying out the education provided. In sample number 6 it can be seen that the sample has the lowest difference value because the patient does not do exercises at home and also the patient is not very enthusiastic in doing the exercises.

2. Hypothesis 2: "MRP intervention can improve the ability of upper extremity functional activity in post-stroke patients" To test the second hypothesis, the One Sample test was used in the treatment group II, which consisted of 6 samples with MRP intervention to improve the ability of functional activities. The WMFT values in table 4.5 at the beginning of the measurement before being given MRP obtained a value with a mean of 54.67 and an SD of 3.53, then after giving MRP a value with a mean of 58.83 and an SD of 2.83 was obtained. Then tested with the One Sample test in treatment group 2 with a P value of 0.001 where P <0.05 which means Ha is accepted, so it can be concluded that there is an increase in the ability of functional activities in post-stroke patients with MRP administration. This was obtained because the sample obtained an effective pattern of exercise for improving postural control and could reduce spasticity by inhibition of abnormal reflex activation mechanisms. With the administration of MRP, the patient learns to return to normal movement patterns through facilitation manual handling. With MRP the patient gets stability to reduce abnormal movements, facilitation so that the patient can make the best possible movement during activities, stimulation with verbal and non-verbal, and inhibition to inhibit and reduce tone. This research was previously conducted by Liphing Chen et al (2018) “Comparison of Motor Relearning Program versus Bobath Approach for Prevention of Poststroke Aphaty: Randomized Controlled Trial” (10). Where in the provision of MRP exercise, it was found that there was an increase in functional activity in post-stroke patients, thus strengthening the authors in this study. The highest WMFT value in the treatment group II the highest sample before being given exercise was achieved by sample number 3 with a value of 63 while the lowest value was achieved by sample number 2 with a value of 47, after being given MRP for 12 times the highest value was achieved by samples number 1 and 4 with a value before given an intervention of 50

for number 1 and 54 for number 4, and after being given an intervention it became 55 for number 1, 59 for number 4, while the lowest value achieved by sample number 3 got the lowest change value of 66 where previously it got a value of 63. occurred in samples number 1 and 4 seen from the patient's understanding to perform the given task and run it well and the sample underwent intervention with discipline in carrying out the education provided. In sample number 3 it can be seen that the sample has the lowest difference value because the patient does not do the exercise at home and the patient feels that he is already good with his previous abilities.

3. Hypothesis III: "There is no difference in effectiveness between CIMT and MRP in the upper extremity in increasing the activity of functional abilities of post-stroke patients" CIMT and MRP can both increase the functional activity of poststroke patients because they have similarities, namely: Based on the data obtained, the mean value of difference 1 in the treatment group 1 is 4.67 with a standard deviation of 1.03, while the mean value of the difference 2 in the treatment group 2 is 4.16 with a standard deviation of 0.75. Based on the results of the independent sample t-test of the data, the value of p = 0.360 where p>0.05. This means that Ho is accepted and Ha is rejected. So it can be concluded that there is no difference in effectiveness between CIMT and MRP in the upper extremity in increasing the activity of functional abilities of post-stroke patients. To strengthen the results of this study, there is already a journal that has conducted research on the differences in the effectiveness of CIMT and MRP on Upper Extermity to increase functional activity in post-stroke patients, namely Bushra Rehman et al., (2015) To Compare the effectiveness of Constraint Induced Movement Therapy Versus Motor Relearning Program to Impromve Motor Function of Hemipegic Upper Extremity After Stroke. In the journal, the results obtained from the CIMT and MRP studies with the MAS and FIM scales showed that there was no significant difference, CIMT and MRP had similar efficiencies in increasing the functional activity of post-stroke patients. To find out how CIMT and MRP can both increase the upper extremity (9) "Constraint-Induced Movement Therapy After Stroke" explains that CIMT can increase the upper extremity. This happens because in CIMT there are two possible motor mechanisms that can improve , the first with a direct effect on the direct pathway, namely increasing cortical excitability in the non-dominant hemisphere through increased use of the non-dominant hand which will improve motor function. Second, the indirect effect (indirect pathway) is an increase in the stimulus from a decrease in stimulation in the dominant hemisphere. And also with the principle of repetitive CIMT, as we already know the concept of neuroplasticity in stroke recovery, the more often you perform a movement, the more brain power is mobilized for that activity. Meanwhile, MRP can increase the upper extremity by

involving motor tasks in the presence of arm and hand movements which consist of a very complex combination of muscle actions. With the aim there is a synapse learning that is repeated over and over again with the aim of producing other neurons that can connect. The growth of new neurons adjacent to the neural network with the aim of increasing the effectiveness of new ones, the emergence of new synapses is indicated to be able to give rise to dynamic synaptogenesis that continues to occur under normal circumstances (10).

Conclusion

1. CIMT can improve upper extremity function in post-stroke patients.
2. MRP can improve upper extremity function in post-stroke patients.
3. There is no difference in effectiveness between CIMT and MRP to improve upper extremity function in post-stroke patients.

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