CONSTRAINT-INDUCED MOVEMENT THERAPY (CIMT) WITH FIVE DAILY ACTIVITIES FOR SEVEN DAYS OF EXERCISE INCREASES MUSCLE STRENGTH ON PATIENTS HEMIPARESIS POST ISCHEMIC STROKE

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Abstract

Stroke make an impact on disturbing activities day living and can cause impaired muscle strength. constraint-induced movement therapy (CIMT) will stimulate the brain to form new neurons. This research aimed to know the effect of CIMT combination with everyday equipment on muscle strength in patient's hemiparesis post-ischemic stroke. Design of quasi-experiment research with one group pretest-posttest. Respondents were taken by consecutive sampling as much as 17 respondents in inpatient ward Hospital, Cimahi. Data were collected using sheet instruments and a manual muscle test. Analyzed by the Wilcoxon test. The results showed that there was a difference score of muscle strength pretest and posttest (p=0,000). Instruments used for measuring differences in the study of normative, valid, and reliable is a manual muscle test. CIMT combined with five daily equipment activities proved to affect increasing muscle strength in a patient's hemiparesis post-ischemic stroke. CIMT combination with five daily equipment a day these days can be applied in hospital intervention to improve muscle strength in patients with hemiparesis post-ischemic strokes.

Keywords: *Activities day living, constraint-induced movement therapy (CIMT), hemiparesis, ischemic stroke, range of motion*

INTRODUCTION

Stroke is a neurological change caused by the impaired supply of blood circulation of the brain, brain cell death due to lack of oxygen caused by blockage or rupture of the arteries in the brain[1,2]. In general, stroke is divided by ischemic stroke and hemorrhagic stroke. The occurrence of ischemic stroke is about 87% due to impaired blood flow that carries oxygen to the brain[3].

Stroke is the cause of death and disability at the government Hospital in Indonesia[4]. Based on Basic Health Research Results (Riskesdas) in 2013 that Indonesia has a prevalence of 7 out of 1000 people suffer from stroke based on the diagnosis of health personnel. Diagnosed 12.1 out of 1000 diagnosed health or symptomatic personnel. Incidence of stroke (incident) of 51,6/100.000 population and disability; 1,6% unchanged; 4,3% is getting worse[4].

Stroke attacks cause neurological deficits that may include motor function loss of motor function will result in weakness or paralysis of the extremities in different degrees depending on the affected part and the extent of the cerebral circulation is impaired, the long-term

immobilization conditions will facilitate the occurrence of various complications, including the formation of DVT, muscle atrophy, contractures and joint pain as well decubitus[1].

Hemiparesis or one side weakness (paresis) results in 8 out of 10 cases of stroke-causing weakness or inability to move one side of the body such as affecting the arms, hands, feet, and facial muscles that affect daily activities such as eating, dressing and using the room bathing, requiring rehabilitation treatment, home exercise, equipment that can aid recovery and mobility[5]. Stroke patients in the neurological room experience hemiparesis and hemiplegia conditions has the characteristics of stroke patients most of the respondents had paralysis (paralysis) left body 19 (63,3%) and 11 (36,7%) body right[6].

Weakness and paralysis of the extremities occur on the affected part and how wide the circulation is disrupted. The unused muscle causes atrophy and loss of muscle strength at a rate of about 12% a week[7]. CIMT is a multifaceted neurorehabilitation technique aimed to improving motor function and improving the use of upper limbs that experience hemiparesis in daily activities[8].

This study use unilaterally different from ROM concept that has been done, the difference of this research is to train hemiparesis patient (learned non-use) perform daily activities such as brushing your teeth, wearing clothes, combing your hair, using the phone, and eating and drinking. This is supported by a systematic review of Cochrane collaboration that unilateral arm exercises are more effective than bilateral exercises (performed exercises on the arm and at the same time) will improve upper extremity function[9].

Nurses and patients in the daily needs indirectly help the healing process, prevention of disability, and death of patients post-stroke hemiparesis ischemic. Induction of daily equipment activities will cause neural plasticity and remodeling in the connectivity pattern of neurons after post-stroke attacks to be optimal[10,11].

Based on the background of the above concept, the researcher is interested to examine the effect of CIMT combination with daily equipment on motor ability in post-stroke hemiparesis patients at RSUD Cimahi City.

MATERIAL AND METHODS

This research applied quasi-experimental with pretest-posttest only. As many as 17 post-ischemic stroke patients with hemiparesis were consecutively recruited from Hospital Cimahi–West Java. Inclusion criteria of patients with muscle strength 1-3, first attack ischemic stroke attack, patients diagnosed ischemic stroke based on doctor's diagnosis, conscious compos mentis and have been treated ≥ 3 days in the city of Bandung in the hospital area in Cimahi. Interventions were performed on the upper extremities by resting on a strong hand using gloves, then hand paresis trying to use daily activities 10 times repetition activity, one-

minute activity, for seven days, among others: 1) Brushing your teeth, 2) Wearing clothes/clothes, 3) Using hair combing equipment, 4) Using the phone, 5) Using cutlery and drinking. Muscle strength were measured twice in pre and seven days of action using a manual muscle test. The muscle strength of the upper extremity, measured by asking the patient to elevate to an extremity having hemiparesis consisting of 0 (no contraction to 5 (normal strength).

This study applied the ethical principles and gained the ethical clearance from the Hospital Cimahi Ethical Committee on May 2018 Letter No 445/019/TKEP and Universitas Padjadjaran Ethical Committee on May 2018 Letter of ethical clearance No 560/UN6.KEP/EC/2018 which is in accordance with the guidelines *International Conference on Harmonisation Good Clinical Practice* (ICH-GCP).

Data collection was conducted from May until July 2018 in Inpatient Ward in Hospital West - Java. The collected data were analyzed descriptively and tested for normality. The normality test found that the data of muscle strength scores were abnormally distributed. Further analysis was conducted to identify the difference in the muscle strength score. Data were analyzed by using the Wilcoxon test.

RESULTS

Characteristics of Respondents

Table 1. Distribution of Respondents by Age, Gender, Education, Admission time (n = 17)

Characteristics	Frequency (n)	Percentage (%)
Age		
46-55 years	3	17,6
56-65 years	8	47,1
> 65 years	6	35,3
Gender		
Man	8	47,1
Woman	9	52,9
Education		
Elementary	9	52,9
Junior High	4	23,5
Senior High	2	11,8
University	2	11,8
Admission time		
Less than 6 hours	11	64,7
More than 6 hours	6	35,3

Based on Table 1 it is found that most respondents aged 55-65 years (8 people or 47,1%) and women (9 people or 52,9%). Most respondents have a primary education level (9 people or 52,9%). The majority of respondents were admission time in the hospital less than 6 hours (11 people or 64,7%).

Muscle Strength

Table 2. The Frequency Distribution of Respondents by muscle strength (n = 17)

Muscle Strength	Pretest		Posttest	
	f	%	*f*	%
1	5	29,4	2	11,8
2	6	35,3	2	11,8
3	6	35,3	3	17,6
4			9	52,9
5			1	5,9

Based on table 2, the patient's muscle strength score before the daily combination CIMT exercise was almost half the results of score 2 and score 3 (6 people or 35,3%) and most of the score 4 were 9 patients (52,9%) after practice CIMT.

The Difference in Mean Muscle Strength of the Joints Before And After

Table 3. The difference in mean muscle strength of the joints before and after (n = 17)

Variable	Median	Min-Max	Diff (*d*)	*Z*	*p*
Muscle strength*			2	-3,520	0,000
Pretest	2	1 – 3			
Posttest	4	1 – 5			

Based on table 3 shows The Wilcoxon test suggested that mean of posttest score was significantly increased (p=0,000) than the mean of pretest score either. It is indicated there was a significant improvement in muscle strength.

DISCUSSION

This research proves that CIMT of five daily activities for seven days of exercise in patients with hemiparesis post-stroke ischemic increased muscle strength. The result of the bivariate analysis shows that there are significant differences in muscle strength before and after the action. The results of this study indicate a significant difference (p) <0.05 both muscle strength (p = 0,000) before and after CIMT exercise combined with daily equipment. The average increase in muscle strength 2 scales (SE: 0,201) to 4 scale (SE: 0,281), based on statistics for scale increase of 2 scales of muscle strength upper extremity (Table 3).

The effect of aging on the nervous system in which neurons undergo intracellular and biochemical changes, lipofusin (aging pigment/cell metabolism wastes) accumulates in cells forming ankle plaque and neurofibrils having a tangle after over 30 years causes dendrites to decrease but intrinsic dendritic changes are quite variable in the hippocampus area at brain damage so that neurotransmitter activity carries impulses from neurons to neurons (neurons

are structural and functional units of the nervous system composed of a cell body, an axon, and some dendrites)[1]. This is supported by research that at the age of 70 years of degeneration process impact on the slow organ recovery process in stroke patients[12].

In this study (Table 1) the faster (admission time) than the risk of smaller infarction, minor damage will help the recovery process motor areas. Correct handling of attacks is 3 - 6 hours (golden period) will reduce disability by 30%[4]. The reperfusion is better than the counterfalization within ≤ 6 hours. MRI showed occlusion of 15 (33%) patients, median penumbral volume 13.4 mL, acute reperfusion 27 (59%) patients[13]. Admission time < 6 hours to the hospital has been shown to increase muscle strength after CIMT training combined with everyday equipment[14]. Conclusion: Reperfusion ≤ 6 hours significant (P <0.05) increased penumbra salvage, reduced lesion growth, and infarct size.

When a decrease in cerebral perfusion results in ischemic on brain tissue due to impaired arterial supply and swelling in surrounding tissue, especially the portion of the penumbral neurons is suspected as ischemic stroke[1]. Rapid handling of the penumbra area will reduce the damage to the infarct area[15]. This is in line with the inclusion criteria of this study all patients 17 people (100%) are first attack strokes will have an effect on the patient recovery process. This is supported by Ardi's (2011) study, the same result that the first stroke was the most common occurrence of 74 patients with neurological deficits due to brain damage, the recovery of patients in the first attack required more time and faster recovery exercises.

The design of this study used a combination of CIMT with the use of daily equipment by induction in the patient's motor area and teaches the family and patients so that patients can be independent at the time in the hospital and the patient after returning home. It also evident that most of the patients Raden Siti Maryam: Effect of Family Support Intervention towards Quality of Life JKP - Volume 6 No 1 April 2018 showed Family support intervention program affected the quality of life [16] and Family Support Towards Self-Management and JKP - Volume 6 No 2 Agustus 2018 showed Ahmad Yamin: Quality of Life integrated nursing care to improve self-management and quality of life[17].

Compulsory exercise of 7 days of activity in the study using 5 daily equipment at performed for 10 times per minute/activities is: 1) the patient holds a toothbrush and tries to brush his teeth, 2) tries to wear a shirt, 3) tries to hold the comb and tries to comb his hair, 4) tries to press the keypad of the phone, 5) tries to hold the spoon and glass and tries to bring the mouth up drink). Repetitive (repetitive) 5 daily activities for 7 days x 10 times per minute x 5 activities proved to improve functional upper extremities. Muscle strength is closely related to the neuromuscular system that the nervous system plays an important role in how to activate the muscle activation of the contraction so that the more muscle nerve fibers that are activated it will be great muscle strength[18].

Another therapy that may contribute to this study's results is neuro repair management. Respondents in this study were prescribed citicoline (CDP-Choline) for maintaining their neuroprotection therapies. The result of this research supports the previous study findings that citicoline has therapeutic effects at an acute ischemic stroke and safe and effective, improving post-stroke enhancing patients' functional recovery. Citicoline given in optimal doses will increase the endogenous mechanism of neurogenesis that contributes to nerve repair in physical therapy and rehabilitation[19].

This should present the critical thinking and author's analysis of the study results. Interpreting the study's results muscle strength in patient's hemiparesis post-ischemic stroke are significant in this section. Reasons for results and implications to the muscle strength in nursing care should be discussed.

CONCLUSION

From this study, the characteristics of hemiparesis patients post-stroke ischemic in General Hospital Cimahi City mostly in the age range 55 – 65 years, women, elementary school, and admission timeless 6 hours. This study is aimed to identify the effect of the CIMT combination of daily equipment on muscle strength. In conclusion, there is a significant effect of increased muscle strength using an induction stimulus of five daily activities for seven days of exercise in patients with hemiparesis post-stroke ischemic. It is important for healthcare professionals in Hospital Cimahi—West Java to consider this CIMT daily equipment combination to be part of the stroke management.

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