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ORIGINAL RESEARCH

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COMBINATION OF HYPNOSIS THERAPY AND RANGE OF MOTION EXERCISE ON UPPER-EXTREMITY MUSCLE STRENGTH IN PATIENTS WITH NON-HEMORRHAGIC STROKE

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Abstract

Background: Range of Motion (ROM) exercise has been identified in the literature that it has an effect in improving muscle strength, especially in patients with stroke. However, little is known about the effect of ROM exercise combined with hypnosis therapy.

Objective: To determine the effect of combination of hypnosis therapy and ROM exercise on upper extremity muscle strength in patients with non-hemorrhagic.

Methods: This study employed a quasi-experiment with pretest-posttest control group design. Thirty-two samples were selected using simple random sampling, which 16 randomly assigned in the experiment and control group. Muscle strength was measured using muscle strength scale. Hypnosis Deepening test was used to measure the level of hypnosis depth. Paired t-test and Independent t-test were used for data analysis.

Results: The mean value of muscle strength in the experiment group was 3.50 and the mean value in the control group was 2.62. Independent sample t-test obtained p-value = 0.012, indicated that there was a statistically significant difference in the mean of muscle strength of upper extremity in the experiment and control group. Paired t-test obtained p-value = 0.000, which indicated that there was significant difference between the average of muscle strength value before and after treatment

Conclusion: The combination of hypnosis therapy and ROM exercise has a significant effect in increasing muscle strength of upper extremity in patients with stroke non-hemorrhagic.

Keywords: stroke; hypnosis; muscle strength; ROM

INTRODUCTION

Stroke as a cardiovascular disease is a sudden neurologic disorder that occurs due to impaired blood flow due to blockage or rupture of blood vessels in the brain ([Gofir, 2009](#)). The incidence of stroke in Indonesia is 7 per 1,000 population ([MOH, 2013](#)). Stroke is divided into two, namely ischemic stroke and hemorrhagic stroke. Ischemic stroke occurs because the blood flow to the brain stops due to atherosclerotic or blood clots that

clog the blood vessels, while hemorrhagic stroke is caused due to the occurrence of bleeding so that blood flow becomes abnormal, and blood that comes out occupy an area in the brain ([Junaidi, 2006](#)).

The main problem of stroke patients is paralysis or muscle weakness at a point or multiple sites from the control circuitry of the motor neuron cells to the muscle fibers. The

most common long-term ability deficit due to stroke is hemiparesis ([Lewis, Heitkemper, Dirksen, O'Brien, & Bucher, 2010](#)). Hemiparesis and hemiplegia are a form of motor deficits that can cause a patient to decrease mobility. This immobilization condition will result in the patient experiencing complications and deficits of ability to perform daily activities, such as doing his/her work, interaction and role of self at home and social environment.

The cause of death in Indonesia is one third caused by stroke. Stroke has the highest incidence rate of 10.8%, followed by coronary heart disease 4.4% and heart failure 0.25%. The prevalence of stroke diagnosed by health professionals' group and those diagnosed with stroke symptoms increased with age, the highest at an average age of 70 years (43.1% and 67%). Stroke tends to be higher in people with low education either diagnosed by health professionals (16.5%) or diagnosed with stroke symptoms (32.8%). The prevalence of stroke in the city was higher than in the village, diagnosed by health professionals (8.2%) and diagnosis of stroke symptoms (12.7%) ([MOH, 2013](#)).

In the General hospital of NTB in 2013 obtained 372 cases of stroke and 39 people died (10.48%). In 2014 stroke cases as many as 264 people and 39 people died (14.77%), and in 2015 cases of stroke increased significantly compared to two years earlier, as many as 530 people consisting of 280 males (52.84%) and 250 females (47.16%), and 142 people died (26.79%).

Preliminary study results conducted in the medical rehabilitation room, obtained an average of stroke patients as many as 15-20 people treated per day. From the number of patients experiencing problems with decreased muscle strength and limited range of extremity motion, both in the form of weakness to move the hands and feet on one part of the body both right and left, and intervention has been given by the nurse is the Range of Motion (ROM) .

Self-care intervention however includes Range of Motion (ROM) exercises and hypnosis in stroke patients. ROM exercise therapy is the provision of motion training intervention to stroke patients with impaired motor function by moving the leg up, down, left, right and spin. Motion exercise with ROM is done 2 times daily for 3 days, which each session is done for 30 minutes. Previous research revealed that passive ROM performed two times per day for 7 days has a significant effect in increasing muscle strength in stroke patients ($p=0.000$) ([Mawarti, 2012](#)). Similar with another study indicated that ROM performed two times a day for 7 days, with 45-60 minutes per session could increase muscle strength 1.70 (34%). The other study showed significant improvement in muscle strength 3.87 (55%) after passive exercises 5 times a day with a duration of 10 minutes for 8 days ([Sikawin, Mulyadi, & Palandeng, 2013](#)).

On the other hand, hypnosis therapy in stroke patients is a therapy with progressive relaxation techniques that will stimulate hormones affecting a person to be more comfortable, such as the neuropeptide hormone. This hormone will be produced when one feels deep relaxation. The technique will also stimulate the Theta system in the body, which this hormone plays for physical relaxation and emotional health. The other hormones include endogenous hormones, benzodiazepines, anamides, melatonin and N N-Dimethyltryptamine ([Rama & Napri, 2015](#)). Hypnosis is also useful for increasing range of motion, increasing grip strength and reducing muscle spasms ([Diamond, Davis, Schaechter, & Howe, 2006](#)).

Previous study showed that hypnosis in patients post-stroke could reduce muscle tension, as well as stabilize emotions, behaviors and motivations in the improvement of healing efforts. Hypnosis therapy also speed up the healing process of the patient with cancer and heart attack. This is possible because hypnosis therapy can be aimed at improving the immune system and reprogramming the individual's attitude in

dealing with his illness ([Rama & Napri, 2015](#)).

However, the combination of hypnotic therapy and ROM exercises could be more useful. Hypnosis can change the sensation, perception, thought, feeling or behavior after being given suggestions; and also useful in reducing anxiety and insomnia, controlling high blood pressure, decreasing depression, and reducing fatigue ([Ng & Lee, 2008](#)).

While ROM exercises have the benefit of determining the value of bone and muscle joint ability in performing movement, improving muscle tone, improving muscle tolerance for exercise, preventing joint stiffness, and improving blood circulation. Range of Motion (ROM) is an exercise performed to maintain or improve the level of perfection of the ability of joint movement in a normal and complete way to increase muscle mass and muscle tone ([Rama & Napri, 2015](#)).

Nowadays, standard therapy used for rehabilitation in stroke patients only focuses on motion exercises and physical improvement of the patient. Therefore, selection of combination of hypnosis therapy and early ROM training is expected to increase muscle strength because it can stimulate the motor as well as increase muscle strength. Besides, little is known about the combination of both interventions. This study aimed to examine the effect of combination of hypnosis therapy and ROM exercise on changes in upper strength muscle strength in patients with non-hemorrhagic stroke.

METHODS

Study Design

This study employed a quasi-experiment with pretest-posttest with control group design.

Sample

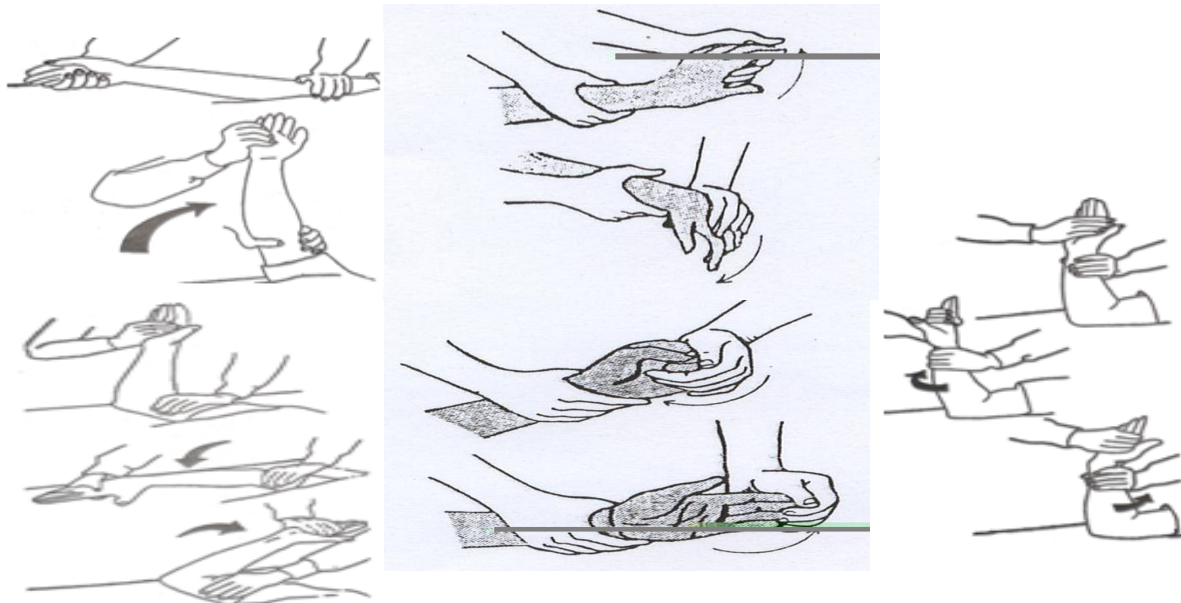
The target population in this study was all patients with non-hemorrhagic stroke in the Medical Rehabilitation Ward of the General

Hospital of Mataram. Thirty-two samples were selected using simple random sampling, which 16 randomly assigned in the experiment and control group. The inclusion criteria of the sample were 1) stroke patients with impaired motor function, with a minimum Medical Research Council (MRC) score of 1 (Muscle Weakness), 2) patients aged ranging from 17 to 50 years, 3) non-hemorrhagic stroke, 4) patients with full awareness (GCS 13-15), and 5) patient's family approved the patient to be the respondent by signing the informed consent. The exclusion criteria included: 1) patients who used ventilator, 2) patients with hearing loss, and 3) patients with ear trauma.

Intervention

Intervention was conducted by the researchers themselves (certified by Indonesian Board of Hypnotherapy), assisted by a professional physiotherapist who works in the medical rehabilitation ward at least 5 years. The intervention started from adjusting the patient's sitting position, and guiding the patient to the relaxation process at a mild trans phase (measured by hypnosis deepening test). The researcher gave positive suggestion and motivation to the patient to be more focused, optimistic and enthusiastic in the process, such as "from now on and on anytime and anywhere during this therapy session, you realize that you are getting excited to follow every part of this therapy that you believe it can help your healing". Patients were given ROM exercises by physiotherapists on body parts that experience muscle weakness. After given motion exercises, the patient was relaxed as in the early stages then the researcher guided the patient to imagine the movement in the healthy arm / leg and then suggested to feel or imagine that the arm / paresis also moved repeatedly for up to 10 minutes, after that the patient was then trained independently to perform mild movements on the body parts that experience weakness, then patients were given suggestions back to be more optimistic and enthusiastic in undergoing the therapy process. Hypnosis therapy and ROM were done 2 times a day for 3 days.

Figure 1 ROM Exercise



Instrument

There are two instruments used in this study as the following:

1. Muscle Strength Scale

Assessment of muscle strength was performed using a scale of muscle strength measurements developed by the Medical Research Council (MRC) ([Lumbantobing, 2000](#)). Muscle strength is expressed with the scale of 0-5, namely: 0 = total paralysis; no muscle contraction at all; 1 = there is a slight muscle contraction, but no motion in the joint moved by the muscle; 2 = gained motion, but this motion is not able to resist gravity; 3 = can hold the movement against gravity; 4 = being able to resist gravity and overcome a little resistance; 5 = no paralysis (normal). This scale is often used to measure motor weakness and see progress over time in weakened muscle strength. Muscle strength can be described as the ability of the muscle to withstand both the external and internal force. Muscle strength is closely related to the neuromuscular system that is how much the ability of the nervous system to activate the muscles to perform contractions. Assessment

of muscle strength has a measurement scale commonly used to check paralyzed patients. In addition, it is also used to see whether there is progress obtained during treatment or deterioration in patients. Researchers used the same muscle strength assessment sheets used by previous researcher. While the measurement of the muscle strength was done by a professional physiotherapist.

2. Hypnosis Deepening Test

It is a test to see how far the subject's consciousness has moved from conscious mind to sub conscious mind. The depth of each person is different and highly dependent on the subject's condition, his understanding of hypnosis, time, environment and skill of the hypnotist or therapist. Based on Davis-Husband Scale ([Wong & Hakim, 2009](#)), levels of hypnosis depth can be divided into 30 levels. Depth requirement also has different intent and purpose in hypnosis process. Patients were observed based on the objective symptoms shown by the patient during the hypnosis process:

Table 1 The depth of hypnosis influence with scores and objective symptoms based on The Davis Hypnotic Susceptibility Test

Depth	Score	Objective symptom
Insusceptible	0	
Hypnoidal	1	Relaxation
	2	The eyelid vibrates
	3	Fluttering and closing of the eyes
	4	Closing the eyes
	5	Perfectly physical relaxation
Light trance	6	The eyelids cannot be opened again
	7	Limb and arm catalepsy
	8,9,10	Tense catalepsy
	11,12	Gloves anesthesia
Medium trance	13,14	Partial amnesia
	15	Anesthesia posthypnotic
	17	Personality changes
	18	Posthypnotic simple suggestion
	20	Kinesthetic
Deep trance	21	Able to open eyes, without trance disturbed
	23	Posthypnotic suggestions are strange
	25	Complete somnambulism
	26	Posthypnotic positive visual hallucination
	27	Posthypnotic positive auditory
	28	hallucination,
	29	Systematized auditory amnesias
	30	Negative auditory hallucination
	Negative visual hallucination	

Data Analysis

Data processing and analysis used SPSS. Univariate data analysis was described with frequency distribution table, while bivariate analysis (normal data distribution) used paired t- test and independent t-test with significance value <0.05.

Ethical Consideration

The study has been approved by NTB Provincial Hospital (Approval number 070/77 / RSUDP / 2017). Prior to data collection, each respondent was asked to sign informed consent and explained about the purpose, benefits and research procedures.

RESULTS

In the table 1 it is known that in the experiment group the number of respondents who had improvement of upper limb muscle strength was 8 respondents and recovered (muscle strength ≥ 4) as many as 8 respondents, and on the range of motion all respondents (16 participants) experienced improvement. While in the control group only 2 respondents had improved upper extremity muscle strength and only 9 respondents showed improvement of upper extremity motion range.

Table 1 Frequency distribution of the characteristics of respondents based on age, gender, and frequency of stroke

Variable	Experiment		Control		p
	N	%	N	%	
Age (Mean \pm SD)	(54.06 \pm 3.974)		(53.8 \pm 3.775)		
40 – 59	13	81.2	15	93.8	0.83
> 60	3	18.8	1	6.2	

Gender					
Male	9	56.2	7	43.8	1.00
Female	7	43.8	9	56.2	
Frequency of Stroke					
First attack	6	37.5	5	31.2	0.48
Second attack or more	10	62.5	11	68.8	
Muscle strength Improvement					
No improvement	0		14	87.5	
Has an improvement	8	50	2	12.5	-
Recovered	8	50	0		
ROM Improvement					
No improvement	0		7	43.75	-
Has an improvement	16	100	9	56.25	
Recovered	0				

Table 2 Frequency distribution of upper extremity muscle strength before and after given intervention in the experiment and control group

Upper extremity muscle strength	N	Group	Mean	SD	Min –Max
Pretest	16	Experiment	2.44	0.96	1 – 4
		Control	2.50	1.03	1 – 4
Posttest	16	Experiment	3.50	0.89	2 - 5
		Control	2.62	0.96	1 - 4

Table 2 shows an increase in the average of upper extremity muscle strength of 1.062 in the experiment group between pretest and posttest, which muscle strength average before intervention was 2.44 with standard of deviation of 0.964, and after intervention was

3.50 with standard of deviation of 0.894. In the control group there was a slight difference in the mean of muscle strength, which was 2.62 with the standard deviation of 0.957 in posttest and 2.50 with standard deviation of 1.033 in pretest.

Table 3 Mean difference of upper extremity muscle strength before and after given intervention in the experiment and control group using Paired t-test

Variable	Group	Intervention	N	Mean	SD	% Improvement	P
Muscle strength	Experiment	Pretest	16	2.44	0.96	43.44%	0.000
		Posttest		3.50	0.89		
		Difference		1.06	0.25		
	Control	Pretest	16	2.50	1.03	4.8 %	0.162
		Posttest		2.62	0.96		
		Difference		0.13	0.34		

Table 3 above shows that the intervention of combination of hypnosis therapy and ROM exercise twice a day for 30 minutes within 3 days increase upper limb muscle strength by 1.06 (43.44%). Paired t-test obtained p-value

= 0.000, which indicated that there was significant difference between the average of muscle strength value before and after treatment in the intervention group.

Table 4 Mean difference of upper extremity muscle strength after given intervention in the experiment and control group using Independent t-test

Variable	Group	N	Mean	SD	t	p
Muscle strength	Experiment	16	3.50	0.89	2.67	0.012
	Control	16	2.62	0.96		
	Difference		0.88			

Table 4 shows the mean values of muscle strength in the experiment group (3.50) was higher than the mean value in the control group (2.62). Independent sample t-test obtained p-value = 0.012, which indicated that there was a statistically significant difference in the mean of muscle strength of upper extremity in the experiment and control group.

DISCUSSION

Findings of this study showed that there was a significant change in muscle strength of upper limb in the experiment group between before and after given the combination of hypnosis therapy and ROM exercise, with effect size of 1.37 considered very strong effect. This effect is higher compared with the effect size of the intervention in other studies.

The average of the improvement of muscle strength in the experiment group was 43.44%, higher than the muscle strength in the control group. This study provides the evidence that the combination of hypnosis therapy and ROM exercise is more effective compared with hypnosis therapy or ROM exercise alone.

The effect of hypnosis therapy combined with ROM exercise threat the stroke patients holistically, which is not only focusing on physics, but also mind ([Mawarti, 2012](#)). Hypnosis changes the sensation, perception, thought, feeling or behavior after being given suggestions ([Rama & Napri, 2015](#)); while ROM exercises have the benefit of determining the value of bone and muscle joint ability in performing movement, improving muscle tone, improving muscle tolerance and blood circulation ([Sikawin et al., 2013](#)).

Basically, the mechanism of hypnosis is central to the direct effect of the central nervous system of the human brain and various organs surrounding the organ, following the physiological pathway physiologically ([Prabowo, 2009](#)). The optimal process of hypnosis done on superficial organs is dominantly regulated by the brain, and the muscle structure that wraps the human body from the outside is the dominance of skeletal muscle with the regulation of the system, which is set completely by the brain ([Prabowo, 2009](#)).

In hypnosis therapy, there is a hypnotic suggestion which one of them is ideomotor suggestion for body movement. Ideomotor suggestion is divided into two types, the first is a direct suggestion that facilitates motor movement such as the suggestion of hand movements to be more severe and ultimately cannot lift, and the second type is a challenge suggestion which is a type of suggestion that inhibits motor activity, such as when suggestions for the client to have arm stiff and cannot bend ([Kihlstrom, Glisky, McGovern, Rapcsak, & Mennemeier, 2013](#)).

During the process of hypnosis, a person's body will feel relaxed, while his mind is very focused and attentive, which is called as the critical factor (CF) or reticular activating system (RAS), is open and unwittingly all information enters the underlying mind consciously unfiltered and become our life program. Conducting a self-program is to bypass the critical factor or penetrate the critical filter and directly communicate with the subconscious mind. By penetrating this critical filter, the conscious mind is deactivated so that the suggestions will be more effective ([Kihlstrom et al., 2013](#)).

Findings of this study will support previous studies which revealed that there was significant effect of hypnosis therapy and ROM exercise on upper extremity muscle strength in stroke patients. As this study only focused on upper extremity muscle strength, thus further study is needed to examine the effect of the combination of hypnotherapy and ROM exercise on lower extremity muscle strength or applied in patients with hemorrhagic stroke. Different setting may be also needed as this study was only in the medical rehabilitation.

CONCLUSION

It can be concluded that the combination of hypnosis therapy and ROM exercise has a significant effect in increasing muscle strength of upper extremity in patients with stroke non-hemorrhagic. This intervention could be applied as a nursing intervention to give a nursing care comprehensively.

Declaration of Conflicting Interest

None declared.

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Author Contribution

All authors contributed equally in this study.

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