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Mirror therapy combined with flashcards on the extremity function and stages of self-acceptance of stroke patients

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ABSTRACT

Background: Psychological changes such as body image are important factors that need to be considered to boost the positive sense of self-acceptance in stroke patients with hemiparesis. One measure that can be taken to minimize the incidence of disability, both physically or psychologically, in stroke patients is mirror therapy (mirror therapy combined with flashcards). This study aims to determine whether mirror therapy combined with flashcards can improve the upper limb muscle strength function and the stages of self-acceptance of stroke patients with hemiparesis.

Methods: This study was quantitative, with an experimental research design. The design used was a quasi-experiment with a pre-test-posttest control group design involving 60 respondents with consecutive sampling techniques for 5 months in the Nusa Indah Ward of the Dr. Doris Sylvanus Palangkaraya General Hospital. Upper extremity/arm muscle strength was measured using the muscle strength scale from the Medical Research Council, while self-acceptance stages were measured using a stage questionnaire adapted from Kubler Ross. Data were analyzed using SPSS version 20.0 for Windows.

Results: Our results showed there was a significant increase in the mean value of muscle strength and self-acceptance stages of the treatment group from the control group ($p<0.05$). The results of the Mancova test showed that gender affects the intervention given ($p<0.05$).

Conclusion: Our study provided information for nurses in nursing care to stroke patients with hemiparesis on the upper arm and motivation to improve the patient's self-acceptance stages.

Keywords: Flash Card, Mirror Therapy, Muscle Strength, Self-Acceptance, Stroke.
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INTRODUCTION

Stroke is one of the neurological syndromes that can potentially cause disability in people.[1] Stroke, one of the leading causes of morbidity and mortality, shows an increasing yearly incident rate. It is the most common cause of death and long-standing disability worldwide. The World Health Organization (WHO) has established that stroke is a clinical syndrome characterized by symptoms in the form of impaired brain function which can cause death or disabilities that persist for more than 24 hours, which can be in the form of physical disability and loss of physical function such as paralysis and communication disorders.[2]

The incidence of stroke in Indonesia has risen sharply to become the third leading cause of death after heart disease and cancer. The incidence of stroke in Indonesia is the highest among countries with the same risk.[3] The 2013 Basic Health Research data shows that 7 out of 1000 people in Indonesia had a stroke. The data show that stroke is the main cause of death at all ages, with the proportion of stroke (15.4%). Based on the results of diagnosis and symptoms, the highest prevalence of stroke was in South Sulawesi (17.9‰), DI Yogyakarta (16.9‰), Central Sulawesi (16.6‰), followed by East Java (16.9‰), and Central Kalimantan (12.1‰). In 2018, the results of Basic Health Research regarding stroke prevalence in Indonesia showed that 9 out of 1000 people were diagnosed with a stroke, with East Kalimantan being the region with the highest rate (14.7‰), while Central Kalimantan ranked 10th between DKI and Central Java.[4]

Medical Record Data of Dr. Doris Palangkaraya General Hospital shows that the number of hospitalized stroke patients has increased yearly. From October to December 2018, 155 stroke patients were hospitalized in the Neurology ward of Dr. Doris Sylvanus Palangkaraya General Hospital. This situation necessitates serious attention because if it is not treated promptly, stroke patients may have paralysis and cognitive impairment. Immediate treatment is vital to reduce the risk of physical disabilities due to stroke.[5] Recovery of limb strength is still a major issue. More than 85% of stroke patients have hemiparesis, and 55%-75% have limited extremities functioning after stroke. Extremity motor function is often disturbed, causing limited functional mobility.[6]

The devastating impact of stroke is not only limited to physical motor function but also includes psychological function because post-stroke patients feel alienated

from people and think they are no longer useful because their lives depend more on others. Stroke patients will likely not be able to do routine tasks like they used to on their own. Stroke impacts all aspects of life, including personal, social, physical, and psychological. Negative psychological conditions appear in stroke survivors as a result of these changes.[7] Psychological changes such as body image are important factors that need to be considered to boost the positive sense of self-acceptance in stroke patients with hemiparesis.[8]

Decreased physical function of stroke patients is one of the stressors that must be addressed. Thus, patients need to be equipped with adaptability and effective coping strategies to avoid developing self-acceptance disorders. One measure to reduce the incidence of disability, both physical and psychological, in stroke patients is alternative therapy. Mirror therapy is one of the emerging therapies to restore physical function, especially muscle strength, in stroke patients.[9-11]

Mirror therapy is a relatively new alternative to restore limb motor function. It is a therapy focused on hemiparetic movements of the upper and lower extremities. It is a relatively new, simple, inexpensive, and reliable technique to repair limbs. This therapy is performed by placing a mirror in the patient's mid-sagittal plane so that the patient can see the image of the healthy hand and providing a visual feedback loop that can correct the extremity. Mirror therapy in stroke patients involves moving the healthy extremity while looking at its reflection in a mirror positioned in front of the affected extremity (not visible), thus creating the illusion as if the impaired extremity is moving.[9-11] This is in line with the study by Sengkey LS et al. showing that mirror therapy is effective in rehabilitating stroke patients.[12] Thus, based on this finding, the authors were intrigued to study the effect of mirror therapy on the extremity function and stages of self-acceptance of post-stroke patients. This study aimed to determine whether giving mirror therapy combined with flashcards can improve the upper limb muscle strength function and the stages of self-acceptance of stroke patients with hemiparesis.

METHODS

This study used a quantitative and experimental study approach. The design used was a quasi-experiment with a pretest-posttest control group design. The population in this study was all stroke patients with hemiparesis treated by the dr. Doris Sylvanus Palangkaraya General Hospital. The sampling technique in this study was non-probability sampling with the consecutive sampling technique. The sample in this study was stroke patients with hemiparesis treated in the Dr. Doris Sylvanus Palangkaraya General Hospital with the following inclusion criteria: aged 30-70 years, willing to be a respondent, good awareness, communicative and cooperative, and having upper extremity hemiparesis. Sixty respondents were divided into 30 for the treatment group and 30 for the control group. The Exclusion criteria were patients with decreased consciousness. The data were analyzed with SPSS version 20.0 for Windows.

This study was conducted in the Nusa Indah ward of Dr. Doris Sylvanus Palangkaraya General Hospital from April to August 2022. Data was collected through a questionnaire sheet in the form of respondent biodata containing the respondent's initials, gender, age, marital status, education, and occupation. The self-acceptance stage questionnaire has been tested for reliability with a Cronbach's alpha coefficient of 0.86, containing 20 questions from 5 stages of self-acceptance.

Analyses in this study included univariate analysis intended to describe the characteristics of each variable. These characteristics were divided into two groups, the intervention group and the control group. Bivariate analysis was carried out to prove the hypotheses of this study. Tests carried out in this study included a simple regression correlation test for the equality of respondents' characteristics, chi-square tests, t test and independent t-test for the sample, and also multivariate analysis to determine the effect of confounding variables on the relationship between independent variables and dependent variables using multivariate analysis of covariance (MANCOVA).

RESULTS

Respondents' characteristics

We included 60 subjects, with 30 subjects in each control and treatment group. The characteristic of the study subject can be seen in Table 1. Based on gender, the percentage between males and females in the control group is the same. While in the treatment group, most subjects were female (56.70%). Based on the age group, both the control and treatment groups mostly consist of the 51-69 years age group (53.30% and 33.33%). Based on marital status, the control and treatment groups consist of subjects with married marital status (80.00% and 66.67%). Based on occupation, both the control and treatment groups consist of unemployed/housewife subjects (50.00% and 43.33%).

Table 2 shows the relationship between confounding variables with self-acceptance and muscle strength in stroke patients with hemiparesis. Only two subjects were categorized as having low self-acceptance, while 58 subjects were categorized as having high self-acceptance. While based on muscle strength, 15 subjects were categorized as having weak muscle strength and 45 as having strong muscle strength. All of the confounding variables didn't have a significant relationship with self-acceptance or muscle strength ($p>0.05$)

The effect of muscle strength and self-acceptance stages

In this study, we also assessed the effect of mirror therapy on muscle strength and self-acceptance in stroke patients. Based on the analysis, we found no significant difference in the mean of muscle strength between the control and intervention groups ($p=0.741$), with the mean of muscle strength for the control and intervention groups being 3.16 vs. 3.27, respectively. While for the self-acceptance parameter, we only found significant differences in the bargaining stage of self-acceptance ($p=0.000$).

We did a multivariate analysis with the MANCOVA test, as seen in Table 4, which showed Box's Equality of Covariance Matrices Test. In Table Box's Test of Equality of Covariance Matrices,

Table 1. Frequency distribution of respondent characteristics based on gender, age group, marital status, and occupation.

Characteristics	Control (n=30) n (%)	Treatment (n=30) n (%)
Gender		
Male	15 (50.00)	13 (43.30)
Female	15 (50.00)	17 (56.70)
Age group		
31 – 40 years	2 (6.70)	3 (10.00)
41 – 50 years	2 (6.70)	4 (13.33)
51 – 60 years	16 (53.30)	10 (33.33)
61 – 70 years	7 (23.30)	9 (30.00)
71 – 80 years	3 (10.00)	4 (13.33)
Marital Status		
Married	24 (80.00)	20 (66.67)
Widowed	4 (13.33)	8 (26.67)
Single	2 (6.67)	2 (6.67)
Occupation		
CS/RETIRED	9 (30.0)	6 (20.00)
Entrepreneur	4 (13.33)	9 (30.00)
Farmer	2 (6.67)	2 (6.67)
Unemployed/Housewife	15 (50.00)	13 (43.33)

the p-value (Sig) = 0.042 ($p<\alpha$), then Ho is rejected, which means that there is a significant difference in matrices of variance or covariance of the dependent variables for all groups (fulfilled).

After multivariate analysis using p-values considering Hotelling's Trace values, we found that gender is significant in the model (both variables, namely muscle strength and self-acceptance stages) with a p-value of 0.007. While marital status, education, occupation, and age did not show significant results on the model (both variables, namely muscle strength and self-acceptance stages) with p-value 0.094, 0.779, 0.246, 0.372, respectively, as seen in Table 5.

DISCUSSION

This study showed that the number of men and women was the same in the control group, namely 50%, while in the treatment group, women outperformed men with 56.7%. In the age group, the highest score was in the age range of 51-60 years. This age range existed in both groups, namely the control group and the treatment group. For marital status, the control group showed a good response, while 'married' was the dominant result for the treatment group. In the occupation distribution, both groups had high retired and entrepreneur status. From the results, it can be concluded that the results of the study on the characteristics of respondents based on gender, age group, marital status, and occupation between the treatment group and the control group tended to be identical. This is in line with the study by Polikandrioti M, stating that stroke was the fifth leading cause of death for men and the third leading cause of death for women.[13] The risk of stroke in men is higher than in women. Stroke affects all individuals of all ages. The older a person is, the higher the risk of stroke. The risk of stroke increases with age, with the incidence doubling every decade after age 55.[2]

The results of the analysis of the relationship between respondent characteristics and muscle strength and stroke patient self-acceptance showed that after being given mirror therapy combined with flashcards, both groups showed that there was no relationship between respondent characteristics, whether gender, marital status, education, occupation, and age group, and muscle strength and self-acceptance, shown by a p-value >0.5. Meanwhile, the results of the analysis of the effect of muscle strength and self-acceptance stages in the treatment group receiving mirror therapy combined with flashcards and also strength and self-acceptance showed that there was a decreased score in the anger stage (-1.23), but p>0.05 and a higher score for upper extremity (arm) muscle strength (0.11) but p>0.05. Furthermore, in the self-acceptance stages of the bargaining stage, the p-value was lower at 0.008. The results of the study of the effect of mirror therapy combined with flashcards on the stages of self-acceptance of stroke patients treated in the Nusa Indah ward of the Dr. Doris Sylvanus General Hospital consisted of 5 (five) stages, namely denial, anger, bargaining, depression, and acceptance. Vasile C expressed that self-acceptance is the state of the individual who has confidence in themselves and is able and willing to live with that situation.[14]

According to Guo F et al., a stroke patient with weakness in the upper extremity is a patient who undergoes changes in physical function, cognitive and body image, which are very important factors that need to be considered in the positive self-acceptance of stroke patients. Loss of physical function is a stressor that stroke patients must face. Without the right adaptive coping strategy, the patient may have a self-acceptance disorder that hinders recovery. A stroke attack can cause a traumatic experience for sufferers because they experience impaired function in certain limbs, which can be limbs or sensory limbs and other body parts.[15] These results are in line with what Irawandi D et al. stated, where cognitive disorders and physical changes in stroke patients make it difficult for them to accept their condition resulting in feelings of sadness, anger and uselessness, hopelessness and weakness.[10]

In stroke patients, it is known that cognitive impairment and physical disability are negatively correlated with hopelessness, meaning that the higher the degree of cognitive impairment and physical disability, the greater the hopelessness of the stroke patient. In this condition, the patient is expected to have a good coping mechanism to accept their condition by building positive thoughts from within them. Positive thoughts in stroke patients can accelerate their adaptation process so that they are more receptive to the changes that happen to them. This is because mirror therapy combined with flashcards affects muscle strength and automatically induces

Table 2. **Relationships between confounding variables with muscle strength measurement and self-acceptance stages of the treatment group and the control group.**

Confounding variables	Dependent Variables									
	Self-Acceptance				p-value	Muscle Strength				p-value
	Low (n=2)		High (n=58)			Weak (n=15)		Strong (n=45)		
	n	%	n	%		n	%	n	%	
Gender										
Man	0	(0.00)	32	(55.20)	0.214	5	(33.30)	27	(60.00)	0.073
Woman	2	(100.00)	26	(44.80)		10	(66.70)	18	(40.00)	
Marital Status										
Married	1	(50.00)	49	(84.50)		13	(86.60)	37	(82.20)	
Single	0	(0.00)	2	(3.40)	0.297	1	(6.70)	1	(2.20)	0.507
Widowed	1	(50.00)	7	(12.10)		1	(6.70)	7	(15.60)	
Education										
Elementary School	1	(50.00)	12	(22.40)		3	(20.00)	11	(24.40)	
Junior High	0	(0.00)	8	(13.80)		3	(20.00)	5	(11.20)	
Senior High	1	(50.00)	25	(43.20)	0.854	7	(46.70)	19	(42.20)	0.806
University	0	(0.00)	10	(17.20)		2	(13.33)	8	(17.80)	
No School	0	(0.00)	2	(3.40)		0	(0.00)	2	(4.40)	
Occupation										
Housewife	6	(40.00)	15	(33.33)		1	(50.00)	20	(34.50)	
CS	2	(13.33)	7	(15.60)		1	(50.00)	8	(13.80)	
Entrepreneur	0	(0.00)	3	(6.70)		0	(0.00)	3	(5.20)	
Private	1	(6.70)	9	(20.00)	0.679	0	(0.00)	10	(17.20)	0.827
Retired	2	(13.33)	5	(11.10)		0	(0.00)	7	(12.10)	
Farmer	2	(13.33)	4	8.90)		0	(0.00)	6	(10.33)	
Others	2	(13.33)	2	4.40)		0	(0.00)	4	(6.90)	
Age group (years)										
< 30	0	(0.00)	2	3.4		0	(0.00)	2	(4.40)	
31-40	0	(0.00)	3	5.2		2	(13.33)	1	(2.20)	
41-50	0	(0.00)	6	10.3	0.507	0	(0.00)	6	(13.30)	0.297
51-60	0	(0.00)	26	44.8		8	(53.33)	18	(40.00)	
61-70	1	(50.00)	15	25.9		3	(20.00)	13	(28.90)	
> 70	1	(50.00)	6	10.3		2	(13.33)	5	(11.10)	

Table 3. **Comparison of upper limb (arm) muscle strength scores and self-acceptance stage scores of stroke patients in the Ruang Nusa ward of the Dr. Doris Sylvanus Palangkaraya General Hospital.**

Variable	Mean of muscle strength and self-acceptance stages		The difference in Mean Value	p-value
	Control Group	Intervention Group		
Upper Extremity Muscle Strength (Arm)	3.16	3.27	0.11	0.741
Denial Stage	14.23	13.4	-0.83	0.031
Anger Stage	11	9.77	-1.23	0.104
Bargain Stage	17.43	15.47	-1.96	0.000
Depression Stage	12.6	13.03	0.43	0.223
Acceptance Stage	15.4	16.3	0.9	0.254
Total Self-acceptance	70.67	67.97	-2.7	0.032

positive thoughts, making patients more motivated to recover. Thus, it can be said that stroke patients' self-acceptance is the result of improved muscle strength. Self-acceptance in stroke patients requires a process in which each individual responds differently. Self-acceptance is achieved when a person can face reality rather than give up on resignation or hope because of loss of role, and body functions are responded to differently by each individual. Motivation from the family and healthcare or nursing team affects patients' psychosocial state in achieving more positive thoughts, in self-acceptance in response to the physical and social transitions that patients experience later in life.[16,17]

Based on this reasoning, stroke patients with upper extremity/arm weakness given mirror therapy intervention combined

Table 4. **Result of Multivariate Tests.**

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.583	35.663[b]	2.000	51.000	.000	.583
	Wilks' Lambda	.417	35.663[b]	2.000	51.000	.000	.583
	Hotelling's Trace	1.399	35.663[b]	2.000	51.000	.000	.583
	Roy's Largest Root	1.399	35.663[b]	2.000	51.000	.000	.583
Sample	Pillai's Trace	.022	.571[b]	2.000	51.000	.568	.022
	Wilks' Lambda	.978	.571[b]	2.000	51.000	.568	.022
	Hotelling's Trace	.022	.571[b]	2.000	51.000	.568	.022
	Roy's Largest Root	.022	.571[b]	2.000	51.000	.568	.022
Gender	Pillai's Trace	.175	5.424[b]	2.000	51.000	.007	.175
	Wilks' Lambda	.825	5.424[b]	2.000	51.000	.007	.175
	Hotelling's Trace	.213	5.424[b]	2.000	51.000	.007	.175
	Roy's Largest Root	.213	5.424[b]	2.000	51.000	.007	.175
Status	Pillai's Trace	.089	2.479[b]	2.000	51.000	.094	.089
	Wilks' Lambda	.911	2.479[b]	2.000	51.000	.094	.089
	Hotelling's Trace	.097	2.479[b]	2.000	51.000	.094	.089
	Roy's Largest Root	.097	2.479[b]	2.000	51.000	.094	.089
Education	Pillai's Trace	.010	.251[b]	2.000	51.000	.779	.010
	Wilks' Lambda	.990	.251[b]	2.000	51.000	.779	.010
	Hotelling's Trace	.010	.251[b]	2.000	51.000	.779	.010
	Roy's Largest Root	.010	.251[b]	2.000	51.000	.779	.010
Occupation	Pillai's Trace	.054	1.443[b]	2.000	51.000	.246	.054
	Wilks' Lambda	.946	1.443[b]	2.000	51.000	.246	.054
	Hotelling's Trace	.057	1.443[b]	2.000	51.000	.246	.054
	Roy's Largest Root	.057	1.443[b]	2.000	51.000	.246	.054
Age Group	Pillai's Trace	.030	.786[b]	2.000	51.000	.461	.030
	Wilks' Lambda	.970	.786[b]	2.000	51.000	.461	.030
	Hotelling's Trace	.031	.786[b]	2.000	51.000	.461	.030
	Roy's Largest Root	.031	.786[b]	2.000	51.000	.461	.030
Gender * Status * Education * Occupation * Age Group	Pillai's Trace	.038	1.008[b]	2.000	51.000	.372	.038
	Wilks' Lambda	.962	1.008[b]	2.000	51.000	.372	.038
	Hotelling's Trace	.040	1.008[b]	2.000	51.000	.372	.038
	Roy's Largest Root	.040	1.008[b]	2.000	51.000	.372	.038

a. Design: Intercept + Sample + Gender + Status + Education + Occupation + Age Group + Gender * Status * Education * Occupation * Age Group
b. Exact statistic

Table 5. **Multivariate p values considering Hotelling's Trace values.**

Variable	p-value	Interpretation
Gender	0.007	Gender is significant in the model (both variables, namely muscle strength and self-acceptance stages)
Marital Status	0.094	Marital Status, Education, Occupation, and Age did not show significant results on the model (both variables, namely muscle strength and self-acceptance stages)
Education	0.779	
Occupation	0.246	
Age Group	0.372	

with flashcards showed statistically significant changes in self-acceptance, where initially, the patients were in the denial and anger stage and reached the acceptance stage after the intervention. The results are in line with the theory brought forward by Lin KC et al., stating that most ways of behaving shown by individuals follow their self-concepts, namely changing individual behaviors and perceptions through good self-management so that they can accept their conditions.[18]

The implementation of mirror therapy combined with flashcards containing education on joint motion range in stroke patients treated in the Nusa Indah ward of the Dr. Doris Sylvanus Palangkaraya Regional Hospital resulted in the activation of both hemispheres of the brain, which can facilitate the recovery of motor muscle strength and self-acceptance of patients.[9] Modified flash cards containing joint motion range that can be carried out patients can improve their muscle strength through afferent fiber stimulation responsible for conveying sensory information to the brain and stretching to the central nervous system to assist and maintain posture and joint

position. While mirror therapy in stroke patients helps provide visual stimulation to the brain. With mirror therapy, the brain is stimulated to re-recognize sensory stimuli resulting in motor recovery of the limbs with hemiparesis through visual illusions.[17] The results of this study align with the previous study by Fryer stated that there was no effect of giving mirror therapy or ROM (range of motion) in stroke patients who had hemiparesis. This was due to the small number of samples and differences in the size of the lesions in the patients. Mirror therapy and ROM exercise in stroke patients did not give significant results when statistical tests were carried out.[6]

Another study in line with the results of this study was the study by Sugiarto D et al., suggesting the insignificance of the results. The best outcome in this study was simply recovery from gripping exercises.[19] While results that are not in line with this study are studies by Kim H et al. on mirror therapy (mirror therapy with electrical stimulation) which showed improvement in upper extremity motor skills in stroke patients on the fourth day for 3 weeks.[17] Another significant study by Lin KC et al. showed that the combination of mirror therapy and somatosensory positively affected the motoric recovery of post-stroke patients, including muscle strength and manual dexterity and mobility, conducted for three weeks. They also said that a combination of two therapies, mirror therapy with ROM, can reduce pain and improve upper extremity function in stroke patients. Most of the explanations and research findings above suggest that mirror therapy with a combination of ROM affects both the treatment and control groups.[18] Another result is also presented by Gou F et al. showing that post-stroke patients with hemiparesis can be manipulated with motor sensory input. Thus, mirror therapy combined with flashcards is one of the sensorimotor inputs to the motor cortex, which plays an important (critical) role in restoring motor skills to post-stroke clients.[15]

The mirror therapy combined with a flashcard study was carried out by the client adjusting a comfortable sitting position, then placing a mirror between the two arms and placing a flash card containing images of the range of joint movement in front of the patient. Then, using the healthy in accordance with the image on the flash card, the patient performed a movement while looking at the mirror and imagining or feeling as if the paretic arm was also moving. This aimed to provide sensory input to the motor area of the cerebral cortex. This finding is in line with Irawandi D et al. demonstrating that to achieve good motor skills in post-stroke patients, cognitive processes, behavioral science and psychology need to be involved, which is based on the researchers' thoughts on the results of mirror therapy combined with flashcards, where patient's learning of motoric motions began with the stage of the patient's cognitive ability to understand the various motion pictures in the given flash card. The patients must learn the motions so that it gradually develops into affective abilities and so on into automation until habitual.[10]

Cognitive abilities emphasize to the patient the importance of awareness to perform motions and exercises on the impaired upper extremity/arm. These efforts can increase sensory input and feedback to the brain, which is the basis for motor control or conscious movement. Therefore, motion exercises with self-awareness of post-stroke patients with upper extremity/arm weakness are vital in healing. This exercise focuses on how the movements are produced according to the images in the studied flashcards. Thus, the patient's active participation in making conscious motions is needed to determine the motor function of their motions or the impaired function of certain limbs, which can affect limbs or sensory limbs and other body parts. In this study, the stroke patients had upper extremity or arm weakness and cognitive impairment. When the pretest was carried out for both groups, the overall self-acceptance scores were in the denial, anger and bargaining stages.[20,21]

The limitation of our study was this study only clinically measured muscle strength and self-acceptance stages of stroke patients with upper extremity/arm weakness treated in the Nusa Indah ward of the Dr. Doris Sylvanus General Hospital through the mirror therapy intervention combined with flashcards, namely giving the therapy for 5-10 minutes, once a day for two weeks, with 6 motions. This study did not study muscle strength reactions and biomolecular self-acceptance stages or other examinations where otherwise the regulation of changes in motor function in the cerebral cortex may be achieved.

CONCLUSIONS

Based on the results, it can be concluded that the characteristics analyzed by multivariate technique with the MANCOVA test showed muscle strength and self-acceptance of the stroke patients in the Dr. Doris Sylvanus Palangkaraya is linearly related to gender variables. It means that gender is statistically demonstrated to make a difference in intervention results in the treatment group. While for the effect of mirror therapy combined with flashcards on the muscle strength of the upper extremity/arm on the self-acceptance of the stroke patients, there is a statistically significant difference between the treatment group and the control group. Suggestions for nurses to be able to provide education on mirror therapy with a combination of flashcards to families who treat stroke patients who experience weakness in their limbs because this therapy is expected to be able to restore motor function in weak limbs.

CONFLICT OF INTEREST

The authors declare that there is no competing interest regarding the manuscript.

ETHICAL CONSIDERATION

This study was approved by Poltekes Palangkaraya ethics committee No. 074/ III/KE.PE/ 2021.

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AUTHOR CONTRIBUTION

All of the authors equally contributed to the study from the conceptual framework, data gathering, and data analysis until the study's results were interpreted on publication.

REFERENCES

1. Purba MM, Utama NR. Disabilitas klien pasca stroke terhadap depresi. Jurnal Kesehatan. 2019;10(3):346-353.
2. American Heart Association (AHA). Heart disease and Stroke Statistics-2017 Update: A Report From the American Heart Association. 2017. Available at: http://circ.ahajournals.org/content/early/2017/01/25/CIR.0000000000000485. Accessed on 3rd February 2023.
3. Suwantara JR. Depresi pasca stroke: Epidemiologi, rehabilitasi, dan psikoterapi. J. Kedokt. Trisakti. 2004;23(1):150-156.
4. Badan Penelitian dan Pengembangan Kementerian Kesehatan RI. Laporan Nasional Riskesdas 2013. 2013. Available at: http://www.litbang.depkes.go.id. Accessed on 3rd January 2023.
5. Ardi M, Sitorus R, Waluyo A. Analisis hubungan ketidakmampuan fisik dan kognitif dengan keputusasaan pada pasien stroke di Makassar. Depok: Universitas Indonesia. 2011.
6. Fryer G. Muscle energy approaches. Neck and Arm Pain Syndromes E-Book: Evidence-informed Screening, Diagnosis and Management. 2011;439(1):1-6.
7. Bienias K, Ścibek J, Cegielska J, Kochanowski J. Evaluation of activities of daily living in patients with slowly progressive neuromuscular diseases. neurologia i neurochirurgia polska. 2018;52(2):222-227.
8. Mewo VY, Chayati N. Exercises to escalate lower extremity muscle strength in stroke patients: a scoping review. Bali Medical Journal. 2021;10(3):1333–1341.
9. Caires TA, Fernandes LFRM, Patrizzi LJ, de Almeida Oliveira R, de Souza LAPS. Immediate effect of mental practice with and without mirror therapy on muscle activation in hemiparetic stroke patients. Journal of bodywork and movement therapies. 2017;21(4):1024-1027.
10. Irawandi D, Sudiana IK, Bakar A. Effectiveness of Mirror Therapy Against Upper Limb Muscle Strength in Ischemic Stroke Patients With Hemiparesis: systematic. In THE PROCEEDING OF. 2018;1(1):37.
11. Dohle C, Püllen J, Nakaten A, Küst J, Rietz C, Karbe H. Mirror therapy promotes recovery from severe hemiparesis: a randomized controlled trial. Neurorehabilitation and neural repair. 2009;23(3):209-217.
12. Sengkey LS, Pandeiroth P. Mirror therapy in stroke rehabilitation. Jurnal Biomedik: JBM. 2014;6(2):1-11.
13. Polikandrioti M. Non-modifiable risk factors for ischemic stroke. HSJ. 2009;1(1): 1-2.
14. Vasile C. An evaluation of self-acceptance in adults. Procedia-Social and Behavioral Sciences. 2013;78(1):605-609.
15. Guo F, Xu Q, Salem HMA, Yao Y, Lou J, Huang X. The neuronal correlates of mirror therapy: a functional magnetic resonance imaging study on mirror-induced visual illusions of ankle movements. Brain research. 2016;1639(1):186-193.
16. Halim R, Gesal J, Sengkey LS. Gambaran pemberian terapi pada pasien stroke dengan hemiparesis dekstra atau sinistra di Instalasi Rehabilitasi Medik RSUP Prof. Dr. RD Kandou Manado periode Januari-Maret tahun 2016. e-CliniC. 2016;4(2):1-8.
17. Kim H, Lee G, Song C. Effect of functional electrical stimulation with mirror therapy on upper extremity motor function in poststroke patients. Journal of Stroke and Cerebrovascular Diseases. 2014;23(4):655-661.
18. Lin KC, Chen YT, Huang PC, Wu CY, Huang WL, Yang HW, et al. Effect of mirror therapy combined with somatosensory stimulation on motor recovery and daily function in stroke patients: A pilot study. Journal of the Formosan Medical Association. 2014;113(7):422-428.
19. Sugiarto D, Andriati A, Laswati H, Kimura H. Comparison of the increase of both muscle strength and hypertrophy of biceps brachii muscle in strengthening exercise with low-intensity resistance training with and without the application of blood flow restriction and high-intensity resistance training. Bali Medical Journal. 2017;6(2):251–257.
20. Manuaba IBAP, Santika NGAPL, Prabawa IPY, Bhargah A, Darmayani S, et al. Simulation-based learning compared with conventional methods in procedural skill. Indonesia Journal of Biomedical Science. 2020;14(2):86-90.
21. Sakti M, Saleh R, Yudha K, Akbar T. Predicting factors for walking ability of postoperative patients with hemiarthroplasty at Wahidin Sudirohusodo Hospital in Makassar. Bali Medical Journal. 2021;10(1):249–255.