

# e\_of\_Motion\_Exercise\_for\_Post- stroke\_Patients\_\_A\_Pilot\_Study. pdf *by*

---

**Submission date:** 09-Mar-2022 03:11AM (UTC+0700)

**Submission ID:** 1779669189

**File name:** e\_of\_Motion\_Exercise\_for\_Post-stroke\_Patients\_\_A\_Pilot\_Study.pdf (163.16K)

**Word count:** 7227

**Character count:** 37439

# Development of Supportive-Educative Range of Motion Exercise for Post-stroke Patients: A Pilot Study

Elly Lilianty Sjattar, PhD<sup>1</sup> , Irna Megawati, MN<sup>2</sup>,  
Andi Masyitha Irwan, PhD<sup>1</sup>, and Sintawati Majid, MN<sup>1,3</sup>

## Abstract

The purpose of this pilot study was to assess of home care intervention on post-stroke related outcome of range of motion and muscle strength. Sample in 40 participants were divided into the intervention group and control group and include 46 this study according to the following criteria: post-stroke period of <12 months with hemiparesis, age of  $\geq 18$  years, and willingness to participate in the study. The intervention was carried out by nurses by providing education for 2 consecutive days and mentoring for 5 consecutive days, while the control group was given standard care and measured using a grip track, handheld dynamometer, and goniometer examination on June to September 2019. For the intervention group, paired t-test analysis confirmed a significant increase in the mean upper extremity muscle strength before ( $35.770 \pm 46.063$ ) and after ( $51.073 \pm 50.866$ ) the 7 day intervention ( $p = .002$ ), whereas the control group showed a value  $36.570 \pm 33.684$  and then  $31.400 \pm 31.760$   $p = .256$  and lower extremity strength before ( $3.627 \pm 1.585$ ) and after ( $4.365 \pm 1.698$ ) 7-days intervention ( $p = .000$ ), whereas the control group showed a value  $3.657 \pm 1.671$  and then  $4.043 \pm 1.849$   $p = .013$ . Almost all the items assessed from Range of Motion (ROM) in the upper and lower extremities showed a significant increase ( $p < .05$ ). Supportive-educative ROM exercise significantly contributed to an increase in the average muscle strength and ROM in post-stroke patients.

## Keywords

supportive-educative, range of motion, post-stroke, muscle strength, home setting, self-care

## Introduction

Stroke is the third leading cause of death globally after coronary heart disease and cancer, and approximately 5.5 million individuals (10%) worldwide die of stroke annually.<sup>1</sup> It is predicted that, in 2030, the death rate due to stroke will reach 200 million.<sup>2</sup> The annual mortality rate due to stroke approaches 133 000.<sup>3</sup> In Indonesia, the mortality rate due to stroke has increased. In 2013, the mortality rate reached 7%,<sup>4</sup> and in 2018, it was 10.9%.<sup>5</sup> In addition, stroke has an impact on the body leading to 5 functional disabilities, that is, (1) paralysis or issues in controlling movement, (2) sensory disturbances, including pain, (3) issues in speaking or understanding language, (4) issues in thinking and memory, and (5) emotional disorders.<sup>6</sup>

Stroke affects an individual's ability to control movement, limitations or impairments with communication, continence, activity of daily living, cognitive performance and emotional disturbances, and sensory or pain disorders.<sup>7</sup> Furthermore, the disturbance in controlling movement or activity is caused by the presence of lesions in the motor cortex.<sup>8</sup> Approximately 85% of patients with stroke will have

motor dysfunction, such as paralysis and paresis in the extremities,<sup>9</sup> walking with body support,<sup>10</sup> and limited range of motion (ROM).<sup>11</sup> This results in the tendency to use healthy limbs, leading to disability and impaired motor function.<sup>12,13</sup> Restoration of motor function requires a long time<sup>14</sup> and it is difficult to conduct in hospitals, especially if the patient resides in remote areas that are inaccessible by public transportation. Therefore an active role of community nurses is necessary to minimize the long-term side effects of stroke.

Community health nursing involves the active role of public health nurses and can minimize the disability and/or inability of patients through promotive, preventive, and

<sup>1</sup>Hasanuddin University, Makassar, Indonesia

<sup>2</sup>University West Sulawesi, Majene, Indonesia

<sup>3</sup>Nurse in Enterostomal Therapy Nurse (ETN) Centre Indonesia, Makassar, Indonesia

### Corresponding Author:

Elly Lilianty Sjattar, Department of Medical Surgical Nursing, Faculty of Nursing, Hasanuddin University, Jl. Perintis Kemerdekaan KM. 10, Tamalanrea, Makassar 90245, Indonesia.

Email: ellyunhas@gmail.com

rehabilitative approaches by ensuring access to required health services and involving clients as partners in the planning, implementation, and evaluation of nursing services.<sup>15,16</sup> Most patients who receive home health care can prevent side effects after hospital discharge.<sup>17</sup> Requiring attention is the harmful effect of stroke that results in disability and/or inability to perform daily needs independently (self-care deficit).

Self-care deficit (inability to meet daily needs) caused by impaired motor function results in patients' dependence on others for their daily needs; therefore, patients with stroke are in dire need of assistance in the form of supportive-educative programs from healthcare workers.<sup>18-20</sup> Supportive-educative intervention is part of the concept of nursing self-care from Orem, which aims to develop health behavior and status, in turn allowing patients to be responsible for their own health.<sup>21</sup> One intervention to help patients with stroke cope with impaired motor function is ROM exercise.<sup>22</sup> The Fungl-Meyer Lower extremity sensorimotor score in the intervention group were significantly higher than the control group after 30-month home-based exercise rehabilitation.<sup>23</sup>

ROM exercises improve joint motion and function and increase muscle mass and tone.<sup>24</sup> ROM exercises are also beneficial in improving physical and mental health in patients with stroke; reducing pain, cramps, dizziness, and stress; and relaxing the body.<sup>25</sup> The results of the study conducted at the RSUP Dr. M. Djamil, Padang, Indonesia, showed that nurses only teach families right and left sloping mobilization to prevent decubitus in patients with stroke.<sup>26</sup> Other studies<sup>27</sup> suggested that providing a 17-week supportive-educative program significantly improves dietary control, exercise, medication use, stress management, and personal hygiene behavior in patients with type 2 Diabetes Melitus (DM) compared with the group that did not undergo a supportive-educative program.<sup>28</sup> also reported that using a self-care model that involved 30 en 17 minutes training sessions could improve all dimensions of quality of life in patients with migraine. Similar to research from Braga and Pinto<sup>29</sup> the training program for caregivers of amyotrophic lateral sclerosis needs total duration for each training program were 2 full days + 1 half day in the weekends. A study conducted by Oupra et al<sup>30</sup> showed that providing education and support to caregivers of stroke survivors for 3 months can reduce caregiver tension and improve their quality of life. Many educative-supportive programs have been conducted for patients with chronic diseases, such as DM, to determine the regularity of their diet and treatment.<sup>28,31</sup> In patients with Tuberculosis, a study has also been conducted and proven using educative-supportive programs to achieve more optimal healing.<sup>32</sup> Therefore, the researcher aims to assess the effectiveness of supportive-educative ROM exercises on health outcomes in patients with stroke in home care settings because the healing process of patients with stroke requires a special approach to achieve maximum outcomes compared with health education in

general, so a method of guidance or assistance and learning support for patients is needed, in the form of an educative-supportive approach to change patients' behavior, to be independent and optimal in their care through the teaching, guiding, and supporting stages.<sup>33,34</sup>

10

## Materials and Methods

This pilot study with qu<sup>11</sup> experimental and control group pretest-posttest research design involved 40 respondents (20 respondents in the intervention group and 20 in the control group) from June to September 2019 receiving post-stroke home care service in Majene Regency, which is one of the provincial capitals of Eastern Indonesia. In general, stroke affects the elderly. Moreover, people having difficulties in accessing health facilities, that is, live in remote areas, not well connected by public transport, living in mountainous areas, unavailability of transportation due to low economic class makes patient transportation all the more difficult. Also, in cases where the houses are on stilts, it renders mobilization of patients with stroke difficult (must be carried down the stairs), besides that, their motivation is low because even though they are out of the hospital, they feel no change. The inclusion criteria for the respondents were as follows: post-stroke period of <12 months with hemiparesis, age of  $\geq 18$  years and have primary caregiver at home. The exclusion criteria were as follows: refusal to participate in this study; stroke with hemiplegia on the face or limb fracture; conditions that could affect the intervention process, such as speech and visual impairment and hearing loss; and inability to read and speak in Bahasa. The dropout criteria were non-participation in the education and mentoring program at a maximum of 2 times, resignation from being a respondent before completion of the assessment process, and death.

We measured the following variables: upper leg strength (griptrack) and lower leg strength (handheld dynamometer), and ROM (goniometer examination). These 3 variables were measured twice, that is, before and after the intervention and tests were conducted using the GripTrack commander, handheld dynamometer, and goniometer. However, this study did not measure the caregiver's knowledge and ability to conduct ROM in patients with stroke.

### GripTrack Commander Inspection Procedures

The measuring instrument was used to assess the strength of the upper limb muscles objectively. This instrument shows the results of the strength of the grip contained on the screen so that researchers can see changes in muscle strength in patients. The GripTrack Commander (Japanese media) was used to measure the grip strength with subjects in a sitting position and their shoulders in an upright position, elbows bent to 90°, and forearms and wrists in the middle position. This instrument has been recommended by the American Society of Hand Therapists.

The accuracy of this device was calibrated from a factory that meets the standards of the National Institute of Standards and Technology; when turned on, the tool will automatically turn to zero and calibrate itself.<sup>35</sup> This tool has been previously used to determine the strength of normal grip strength of children aged 6 to 12 years in Saudi Arabia<sup>36</sup> and grip strength and nutritional risk in hospitalized patients with gastrointestinal and liver diseases<sup>37</sup> and provide physiological and psychological examinations for the development of indicators of the daily life in the elderly population.<sup>38</sup>

#### 1 Examination Procedure Using the Handheld Dynamometer (HHD; $\mu$ TAS MT-1 or $\mu$ TAS F-1; Anima Inc., Tokyo, Japan)

18 This instrument was used to measure objectively the strength of the lower limb muscles and displayed the results of the strength of the muscles of the lower limbs, which was assessed in units of Newtons or kilograms. The application of this device was easier than that of the isokinetic dynamometer. The handheld dynamometer is a tool to measure muscle strength that is most appropriate in the clinical field.<sup>39</sup> The reliability of the tool has been tested with excellent results. More consistent measurement results can be used to detect subtle changes in ankle dorsiflexor muscle strength<sup>40</sup> and measure the muscle strength of the upper extremity.<sup>40</sup> Additionally, this tool has been used in measuring the strength of lower limb muscles in patients with type 2 DM.<sup>42</sup>

#### Goniometer Examination Procedure

The manual goniometer is also a measurement instrument that measures motion by placing it on a fulcrum device. It was certified by the International Standards of Measurement and calibrated by the manufacturer. This tool was previously used in several studies for ROM.

#### Supportive Education Procedures in Patients With Stroke

This study collected data from home visit that was previously conducted at Majene district hospital. The intervention was performed in 2 stages, that is, providing education and mentoring. Education was imparted for 2 consecutive days for duration of 45 minutes per day. The participants in this stage were patients and their families, because the family can provide support, care and motivation.<sup>43</sup> The supportive-educative approach on the first day was applied using picture booklet media, which is based on the results of discussions with experts in their field (1 physician of stroke nursing and 1 physiotherapist). The content of the booklet was as follows: definition, signs and symptoms, cause of stroke, understanding ROM, benefits, and ROM procedures with each movement accompanied by pictures. The booklet was also

accompanied by a logbook to facilitate evaluation of the progress of movement of patients with stroke. A study suggested that providing information using picture booklets has been proven effective and economical in controlling an individual's condition and can help respondents improve their physical and psychological function.<sup>44</sup>

The booklet given to respondents contained signs and symptoms of stroke, causes, complications, risk factors and post-stroke patient care, benefits of ROM, contraindication of ROM, and ROM implementation procedures, using presentation methods, questions and answers, demonstrations, and guidance for 45 minutes. A logbook was provided as a daily record of daily ROM implementation. A log book was maintained to record and report the activities and to check the progress of the upper and lower extremity strength and range of motion. The application of paper-based home exercises (logbooks) was no worse than the use of advanced technology based on tablets in post-stroke patients.<sup>45</sup> Other studies also used logbooks as evaluation materials for post-stroke patients at home.<sup>41</sup> On the second-day meeting, a ROM exercise demonstration was held for 45 minutes for patients with stroke.

The second stage of intervention was mentoring. Mentoring was performed for 5 consecutive days in the morning through home visits by researchers, whereas standard care was implemented in the control group. All study end points were assessed at 7 day after intervention (Figure 1) using the same test sequence. The mentoring session was done in the morning because patients started the activities in the morning, thus it was easy to demonstrate ROM exercise and the methods used at this mentoring stage on the third to sixth meetings, assistive and supportive approaches (providing encouragement to patients with stroke by giving praise and a thumbs up) and demonstration of ROM exercise were conducted. Furthermore, on the seventh-day educational evaluation, question and answer techniques were provided.

#### 8 Statistical Analysis

A t-test was used for hypothesis testing to determine changes in the mean before and after treatment with a significance level ( $p < .05$ ).

## Results

### Characteristics of Respondents

The average age of the respondents was  $57.40 \pm 10.349$  years, and the average duration of stroke was 6.20 months with standard deviation of  $\pm 3.283$ , whereas in the control group, the average age of the respondents was  $55.15 \pm 10.064$  years, and the average duration of stroke was  $7.25 \pm 3.00$  months. There were more male respondents ( $n = 11, 27.5\%$ ) in the intervention group and less in the control group ( $n = 5, 12.5\%$ ) 11 respondents (27.5%)

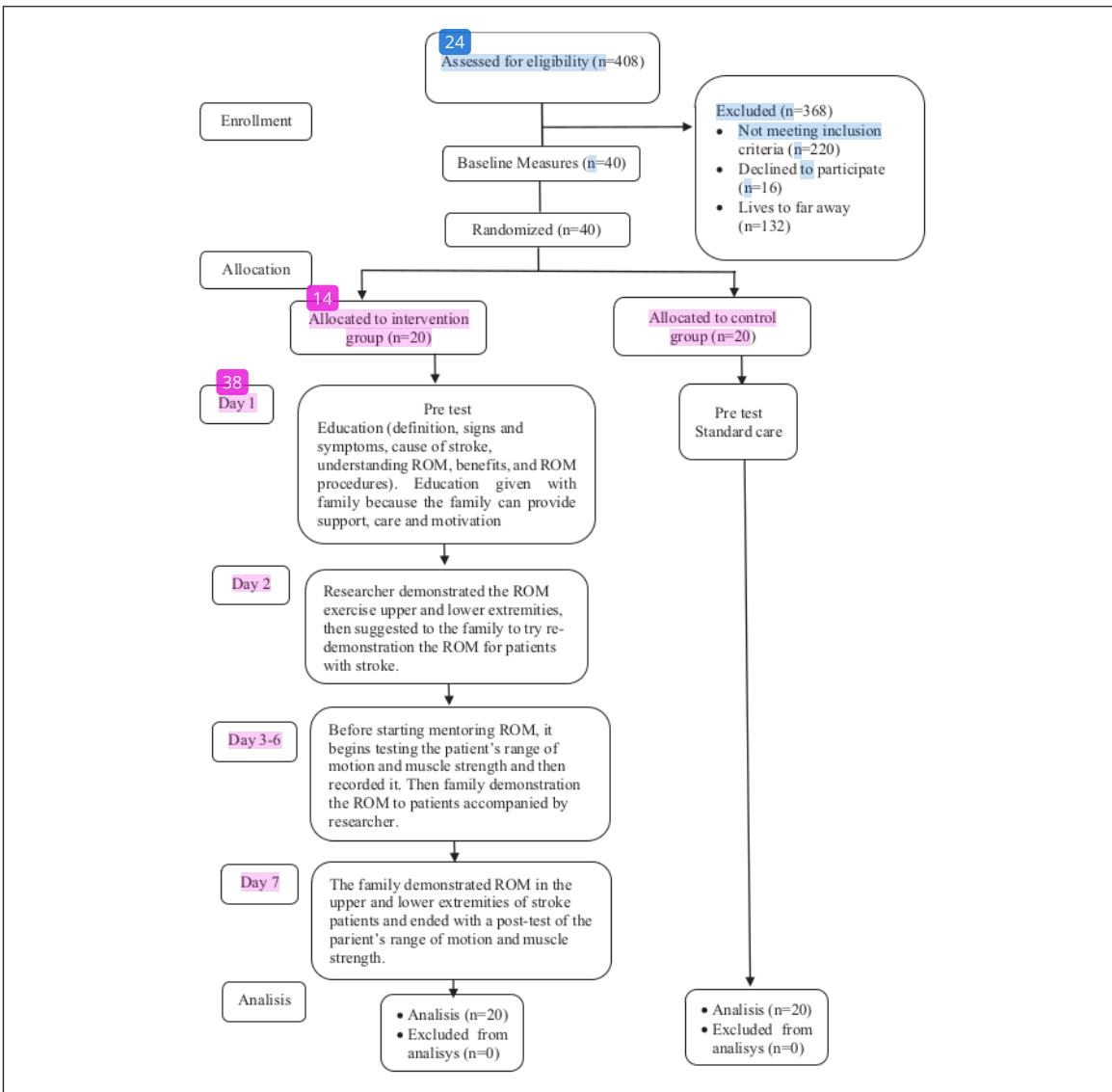


Figure 1. Flowchart of the respondents.

11 had paralysis on the right side in the intervention group, and 10 respondents (25%) had paralysis in the control group. There were 16 respondents (40%) with a history of hypertension, whereas in the control group, all respondents had a history of hypertension, 2 respondents (5%) had a history of DM in the intervention group and 5 (12.5%) in the control group, 13 (32.5%) in the intervention group with history of hypercholesterolemia and gout in the intervention group, whereas in the control group, 16 respondents (40%) had a history of hypercholesterolemia and 14 (35%) had gout disease, 5 (12.5%) with obesity similar to

8 that obtained in both the intervention group and control group, 2 (2%) with family history of stroke in the intervention group, and 5 (12.5%) with smoking history in the intervention group, whereas in the control group, 3 respondents (7.5%) had smoking history. None of the respondents had a history of alcohol consumption (n=40, 100%) in both the intervention group and control group, 52 consumption of fatty foods (n=7, 17.5%), whereas in the control group (n=13, 32.5%), and fried foods (n=13, 32.5%) the same number in both the intervention group and control group (Table 1).

**Table 1.** Frequency Distribution Based on the Demographic Characteristics of Patients with Stroke.

Characteristics	Intervention group	Control group
Age (mean ± SD) (Year)	57.40 ± 10.349	55.15 ± 10.064
Duration of Stroke (mean ± SD) (Month)	6.60 ± 3.283	7.25 ± 3.007
Sex		
Male, n (%)	11 (27.5)	5 (12.5)
Female, n (%)	9 (22.5)	15 (37.5)
Side of the body with paralysis		
Right, n (%)	11 (27.5)	10 (25)
Left, n (%)	9 (22.5)	10 (25)
History of hypertension		
No, n (%)	4 (10)	0 (0)
Yes, n (%)	16 (40)	20 (50)
DM		
No, n (%)	18 (45)	15 (37.5)
Yes, n (%)	2 (5)	5 (12.5)
Hypercholesterolemia		
No, n (%)	7 (17.5)	4 (10)
Yes, n (%)	13 (32.5)	16 (40)
Gout		
No, n (%)	7 (17.5)	6 (15)
Yes, n (%)	13 (32.5)	14 (35)
Obesity		
No, n (%)	15 (37.5)	15 (37.5)
Yes, n (%)	5 (12.5)	5 (12.5)
Family history of stroke		
No, n (%)	18 (45)	20 (50)
Yes, n (%)	2 (5)	0 (0)
Smoking history		
No, n (%)	15 (37.5)	17 (42.5)
Yes, n (%)	5 (12.5)	3 (7.5)
No Alcohol consumption, n (%)	20 (50)	20 (50)
Fatty food consumption		
No, n (%)	13 (32.5)	7 (17.5)
Yes, n (%)	7 (17.5)	13 (32.5)
Fried food consumption		
No, n (%)	7 (17.5)	7 (17.5)
Yes, n (%)	13 (32.5)	13 (32.5)

### Muscle Strength Variable

The upper limb muscle strength in patients with stroke before the intervention in the form of educative-supportive ROM was  $35.770 \pm 46.063$ , and after daily intervention for 7 days, there was an increase in the mean value to  $51.073 \pm 50.866$  and, the *t*-test results obtained a significant increase in muscle strength with a significant value of 0.002 in the intervention group, whereas in the control group, the values before daily intervention were  $36.570 \pm 33.684$  and those after daily intervention were  $32.00 \pm 31.760$ , with a significance of 0.256. The difference between the intervention group and control group before the intervention in the form of educative-supportive ROM  $p = .950$ , and after 7 days, it was  $p = .151$ .

As for the lower limb strength in patients with stroke, the mean values before and after the intervention were  $3.627 + 1.585$  and  $4.365 \pm 1.698$ , respectively, with a significant

value of 0.000, indicating a significant increase in muscle strength of the lower limbs in patients with stroke patients in the intervention group, whereas in the control group, the values before intervention were  $3.657 \pm 1.671$  and those after intervention were  $4.043 \pm 1.849$ , with a significance of 0.013. The difference between the intervention group and control group before the intervention was  $p = .954$ , and after 7 days, it was  $p = .569$  (Table 2).

### ROM Variable

Statistically, almost all ROMs in the upper and lower extremities (shoulder flexion, shoulder extension, shoulder abduction, shoulder adduction, shoulder rotation, shoulder outside rotation, elbow flexion, elbow extension, arm supination, wrist flexion, wrist extension, wrist abduction, wrist adduction, finger flexion, finger extension, finger hyperextension,

**Table 2.** Changes in the Average Muscle Strength Before and After Intervention in Patients with Stroke in Majene Regency.

Muscle strength	Pre intervention		p-value <sup>a</sup>	Post intervention		p-value <sup>a</sup>	p-value <sup>b</sup> intervention	p-value <sup>c</sup> control
	Intervention group Mean ± SD	Control group Mean ± SD		Intervention group Mean ± SD	Control group Mean ± SD			
Upper extremity	35.770 ± 46.063	36.570 ± 33.684	.950	51.073 ± 50.866	31.400 ± 31.760	.151	.002	.256
Lower extremity	3.627 ± 1.585	3.657 ± 1.671	.954	4.365 ± 1.698	4.043 ± 1.849	.569	.000	.013

<sup>a</sup>Independent t-test.

<sup>b</sup>Paired t-test for intervention group.

<sup>c</sup>Paired t-test for control group.

thumb flexion, finger abduction, pelvic flexion, pelvic extension, pelvic abduction, pelvic adduction, pelvic rotation, pelvic outer rotation, dorsiflexion of the ankle, plantar flexion of the ankle, and toe flexion) show significant results ( $p < .05$ ), except for arm pronation ( $p = .156$ ), thumb extension ( $p = .080$ ), knee flexion and knee extension ( $p = .083$ ), and toe extension ( $p = .352$ ) in the intervention group, whereas in the control group, all ROMs in the upper and lower extremities showed no significant result ( $p > .05$ ). The intervention group and control group before the intervention showed no difference in all ROMs in the upper and lower extremities, and after the intervention, there was a difference in shoulder flexion ( $p = .034$ ), shoulder extension ( $p = .034$ ), shoulder abduction ( $p = .038$ ), shoulder adduction ( $p = .017$ ), finger hyperextension ( $p = .012$ ), dorsiflexion of the ankle ( $p = .022$ ), plantar flexion of the ankle ( $p = .007$ ), and toe flexion ( $p = .008$ ), except for shoulder rotation, shoulder outside rotation, elbow flexion, elbow extension, arm supination, arm pronation, wrist flexion, wrist extension, wrist abduction, wrist adduction, finger flexion, finger extension, thumb flexion, thumb extension, finger abduction, pelvic flexion, pelvic extension, pelvic abduction, pelvic adduction, pelvic rotation, pelvic outer rotation, knee flexion, knee extension, and toe extension (Table 3).

## Discussion

This study aimed to determine the development of educative-supportive range of motion exercises for post-stroke patients in the home care setting. Development of educative-supportive range of motion exercises for post-stroke patients. Showed significant results on the strength of the upper and lower limb muscles, which presented a significant increase after the intervention of educative-supportive ROM and 7 day mentoring in a home care setting. A survey reported that one of the top 3 interventions used by 82% of practitioners of post-stroke home program was in the form of muscle strength training with ROM.<sup>46</sup> Increased lower limb muscle strength has a positive correlation with the ability to walk and comfort in patients with stroke,<sup>47</sup> whereas the upper extremity strength affects health-related quality of life (HRQoL) associated with self-care, usual activities, pain discomfort, and anxiety or depression.<sup>48</sup> Although it is known to have an impact on HRQoL, post-stroke patients' compliance with home exercise

programs (HPEs) is still not ideal.<sup>49</sup> Some of the most common barriers to HPE compliance in post-stroke patients include low motivation, lack of caregiver support, and frustration and pain.<sup>46</sup> The educative-supportive approach is known to change the patient's behavior to be independent and optimal in their care through the teaching, guiding, and supporting stages<sup>33</sup> so that the provision of educative-supportive and mentoring ROM training by therapists and caregivers is recommended as an additional intervention while undergoing the HPE. This is consistent with the role of nurses in the community in improving the independence of the family and in providing care for family members after stroke.<sup>50</sup>

This study also showed a significant increase in ROM in the shoulders, elbows, arms, wrists, fingers, pelvis, and ankles. Other studies on ROM exercise interventions reported an increase in the ROM of upper limb extension, but the increase was not significant.<sup>51</sup> However, another finding related to the results of this study is the significant increase in ROM in the upper extremity after exercise therapy interventions, physical therapy, and health education guidance in post-stroke patients,<sup>52,53</sup> so we assume that ROM exercises combined with an educative-supportive approach and mentoring for 7 consecutive days increase the ROM significantly. Another factor that influenced the results of this study is the accuracy and precision of the ROM measurements, in which a study reported significant differences by 3 assessors with different levels of experience and expertise,<sup>54</sup> but in this study, only 1 assessor conducted the measurements. Further research related to the accuracy and precision of the caregiver as an appraiser is needed to validate the measurement results. Strategies are needed to implement educative-supportive interventions for post-stroke patients, at home care agencies in Indonesia and globally by increasing the role (involvement) and support of caregivers so that patients are more motivated to participate all programmed sessions.

## Recommendation

The value of upper and lower extremity muscle strength and ROM can be quantified objectively using gripper, handheld dynamometer, and a goniometer examination employed in the current study. From the findings, it has observed a change in muscle strength and ROM after an intervention for 7 consecutive days. The mood of patients with stroke often changes; therefore, sometimes, they need to wait until their

**Table 3.** Difference in Mean Increase in Range of Motion Before and After the Intervention in Patients with Stroke in Majene Regency.

Range of motion	Pre intervention			Post intervention			p-value <sup>b</sup>	p-value <sup>c</sup> intervention	p-value <sup>c</sup> control
	Intervention group	Control group	p-value <sup>a</sup>	Intervention group	Control group	p-value <sup>a</sup>			
	Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD				
Shoulder flexion	142.50 ± 24.693	141.30 ± 26.142	.882	153.95 ± 20.379	137.85 ± 25.629	.034	.000	.054	
Shoulder extension	142.50 ± 24.693	141.30 ± 26.142	.882	153.95 ± 20.379	137.85 ± 25.629	.034	.000	.054	
Shoulder abduction	133.55 ± 29.373	133.45 ± 29.929	.992	149.50 ± 22.282	130.70 ± 32.077	.038	.006	.087	
Shoulder adduction	30.60 ± 8.840	30.35 ± 8.425	.928	34.70 ± 5.583	29.05 ± 8.451	.017	.001	.155	
Shoulder rotation	67.70 ± 29.647	68.75 ± 27.577	.908	71.70 ± 25.394	68.50 ± 30.478	.720	.018	.955	
Shoulder outer rotation	63.70 ± 21.492	63.85 ± 16.791	.981	71.55 ± 20.109	59.90 ± 17.773	.060	.005	.235	
Elbow flexion	125.95 ± 12.111	127.35 ± 12.326	.719	132.65 ± 9.756	127.95 ± 11.288	.167	.000	.762	
Elbow extension	125.95 ± 12.111	127.35 ± 12.326	.719	132.65 ± 9.756	127.95 ± 11.288	.167	.000	.762	
Arm supination	73.20 ± 27.169	66.75 ± 30.876	.487	78.20 ± 20.096	67.50 ± 29.580	.189	.018	.330	
Arm pronation	75.90 ± 29.008	70.35 ± 30.662	.560	80.50 ± 20.384	69.70 ± 30.706	.189	.156	.222	
Wrist flexion	66.05 ± 17.370	66.75 ± 20.084	.907	73.15 ± 15.267	63.65 ± 18.537	.085	.000	.189	
Wrist extension	70.85 ± 15.174	67.50 ± 21.120	.568	77.25 ± 10.882	67.05 ± 21.010	.061	.003	.529	
Wrist abduction	12.50 ± 9.157	13.55 ± 5.346	.660	16.70 ± 7.787	13.30 ± 5.141	.111	.000	.330	
Wrist adduction	17.90 ± 10.682	17.50 ± 10.324	.905	21.35 ± 10.449	16.95 ± 8.550	.153	.000	.555	
Finger flexion	76.90 ± 22.504	72.25 ± 18.099	.476	80.55 ± 19.702	69.75 ± 17.204	.073	.047	.171	
Finger extension	76.90 ± 22.504	72.25 ± 18.099	.476	80.55 ± 19.702	69.75 ± 17.204	.073	.047	.171	
Finger hyperextension	20.70 ± 10.322	18.20 ± 9.468	.430	25.05 ± 9.660	17.20 ± 9.209	.012	.009	.330	
Thumb flexion	54.25 ± 18.373	56.00 ± 18.750	.767	57.55 ± 20.626	54.50 ± 18.560	.626	.030	.581	
Thumb extension	35.15 ± 17.021	33.80 ± 12.664	.778	40.30 ± 11.775	33.55 ± 12.584	.088	.080	.908	
Finger abduction	59.35 ± 9.653	57.00 ± 12.917	.518	60.35 ± 8.756	56.00 ± 14.198	.251	.035	.330	
Pelvic flexion	81.75 ± 19.426	80.30 ± 19.186	.814	87.40 ± 20.009	78.50 ± 22.061	.189	.000	.314	
Pelvic extension	81.75 ± 19.426	80.30 ± 19.186	.814	87.40 ± 20.009	78.50 ± 22.061	.189	.000	.314	
Pelvic abduction	22.10 ± 7.115	23.20 ± 4.991	.575	24.70 ± 6.522	22.90 ± 5.721	.359	.000	.681	
Pelvic adduction	22.10 ± 7.115	23.20 ± 4.991	.575	24.45 ± 6.992	22.40 ± 5.500	.309	.000	.107	
Pelvic rotation	20.40 ± 9.955	21.65 ± 5.153	.621	23.45 ± 8.947	20.20 ± 7.818	.229	.000	.475	
Pelvic outer rotation	16.65 ± 8.780	16.15 ± 9.010	.860	20.35 ± 6.923	15.60 ± 9.213	.073	.000	.652	
Knee flexion	126.10 ± 4.919	125.75 ± 4.940	.824	127.60 ± 4.285	123.70 ± 10.569	.134	.083	.270	
Knee extension	126.10 ± 4.919	125.30 ± 6.088	.650	127.60 ± 4.285	123.45 ± 10.719	.116	.083	.371	
Foot dorsiflexion	9.10 ± 7.622	9.75 ± 5.748	.762	12.50 ± 5.296	8.65 ± 4.880	.022	.000	.244	
Foot plantar flexion	14.45 ± 7.584	14.55 ± 7.200	.966	19.35 ± 9.218	12.25 ± 6.340	.007	.002	.250	
Toe flexion	35.50 ± 4.989	35.00 ± 5.130	.756	37.10 ± 4.077	32.80 ± 5.473	.008	.041	.073	
Toe extension	42.40 ± 11.445	41.95 ± 11.852	.903	43.40 ± 11.609	41.90 ± 10.862	.675	.352	.951	

<sup>a</sup>Independent t-test.

<sup>b</sup>Paired t-test for intervention group.

<sup>c</sup>Paired t-test for control group.

mood is stable. The present study recommends a sustained ROM intervention needs educative-supportive for better results than only ROM. Further research with larger sample size and with RCT design is recommended

### Conclusion

The effectiveness of the educative-supportive approach on health outcomes of patients with stroke, increases the muscle strength of the upper and lower extremities and joint ROM in patients with stroke effectively.

ROM therapy is more effective if accompanied by an educative-supportive approach on an ongoing basis by involving the family, which leads to better results obtained and should be conducted at the home of the patient or respondent so that they can be directly evaluated and facilitated by the respondents along with a community nurse who could always monitor and provide motivation in stroke patients, particularly those with self-care deficits.

### Acknowledgments

We would like to thank the respondents who participated in this study and the Graduate School of Health Sciences, Kanazawa University, for lending us a handheld dynamometer and handgrip commander to measure the strength of the upper extremity muscles.

### Author Contributions

IM conceived and designed the study, conducted research, provided research materials, and collected and organized the data. ELS and AMI analysed and interpreted the data. ELS, IM, AMI and S wrote the initial and final drafts of the article. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

### Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.


### Ethical approval

This study obtained an ethical clearance from the Faculty of Medicine of Hasanuddin University (Makassar, Indonesia) under number 450/UN4.6.4.5.31/PP36/2019.

### Concent

Measurements were conducted after obtaining informed consent from the respondents, namely, at the first meeting (pre) and first weekend (post).

### ORCID iD

Elly Lilianty Sjattar  <https://orcid.org/0000-0002-7376-5771>

### 22

### Availability of Data and Material

All data are available from the corresponding author upon reasonable request.

### References

1. WHO. *Death from Stroke. Waste Age*. WHO; 2018.
2. Lemmi V, Blanchet K, Gibson LJ, et al. Community-based rehabilitation for people with physical and mental disabilities in low- and middle-income countries: a systematic review and meta-analysis. *J Dev Effect*. 2016;8(3):368-387. doi:10.1080/19439342.2016.1157623
3. Benjamin EJ, Virani SS, Callaway CW, et al. Heart disease and stroke statistics-2018 update: a report from the American Heart Association. *Circulation*. 2018;137:e67-e492. doi:10.1161/CIR.0000000000000558
4. Wijaya HR, Supriyanto E, Salim MIM, Siregar KN, Eryando T. Stroke management cost: review in Indonesia, Malaysia and Singapore. *AIP Conf Proc*. 2019;2092(April):1-8. doi:10.1063/1.5096726
5. Indonesian Health Ministry. Hasil Utama Riset Kesehatan Dasar. Kementerian Kesehatan Republik Indones. Published 2018;1-100. [https://kesmas.kemkes.go.id/assets/upload/dir\\_519d41d8cd98f00/files/Hasil-risikesdas-2018\\_1274.pdf](https://kesmas.kemkes.go.id/assets/upload/dir_519d41d8cd98f00/files/Hasil-risikesdas-2018_1274.pdf)
6. Lewis SLM, Dirksen SR, Heitkemper MM, Bucher L. *Medical-Surgical Nursing: Assessment and Management of Clinical Problems*. 9th ed. Elsevier; 2014.
7. Zoratti MJ, Fisher K, Guthrie D, Griffith LE. A profile of older adults with a history of stroke receiving home care in Ontario, Canada. *Home Health Care Manag Pract*. 2019;31(3):162-171. doi:10.1177/1084822318823731
8. Hall JE. *TextBook of Medical Physiology*. Vol. 13, Elsevier; 2016. 1-1046 p.
9. Maeda H, Imada K, Ishida K, Akima H. Relationship of quadriceps muscle thickness with motor paralysis and muscle echo intensity in post-stroke patients. *Eur Neurol*. 2019;81(1-2):56-62. doi:10.1159/000500415
10. Pundik S, McCabe J, Skelly M, Tatsuoka C, Daly JJ. Association of spasticity and motor dysfunction in chronic stroke. *Ann Phys Rehabil Med*. 2019;62(6):397-402. doi:10.1016/j.rehab.2018.07.006
11. Elmasry M, Mohammad ZA, Shehat G, Ghanem H. Effect of an exercises programme on reducing musculoskeletal complications for stroke immobilized patients. *Assiut Sci Nurs J*. 2015;3(6):60-68. doi:10.21608/asnj.2015.59787
12. Feigin VL, Forouzanfar MH, Krishnamurthi R, et al. Global and regional burden of stroke during 1990-2010: findings from the Global Burden of Disease Study 2010. *Lancet*. 2014;383(9913):245-255. doi:10.1016/s0140-6736(13)61953-4
13. Langhorne P, Coupar F, Pollock A. Motor recovery after stroke: a systematic review. *Lancet Neurol*. 2009;8(8):741-754. doi:10.1016/S1474-4422(09)70150-4
14. Raffin E, Hummel FC. Restoring motor functions after stroke: multiple approaches and opportunities. *Neuroscientist*. 2018;24(4):400-416. doi:10.1177/1073858417737486
15. Herawani. Pedoman Kegiatan Perawat Kesehatan Masyarakat di Puskesmas. Direktorat Bina Pelayanan Keperawatan dan Keteknisan Medik Kementerian Kesehatan Republik Indonesia; 2004. 74 p. [https://www.academia.edu/10864363/PEDOMAN\\_PERKESMAS\\_DI\\_PUSKESMAS](https://www.academia.edu/10864363/PEDOMAN_PERKESMAS_DI_PUSKESMAS)
16. Rachma N, Widiyastuti RH, Andriany M, et al. Pelaksanaan Perawatan Kesehatan Masyarakat dalam Rangka Program Indonesia Sehat Dengan Pendekatan Keluarga. *J Perawat Indones*. 2019;3(3):209-220. doi:10.32584/jpi.v3i3.417
17. Tsilimingras D, Zhang L, Chukmaitov A. Postdischarge adverse events among patients who received home health care services. *Home Health Care Manag Pract*. 2019;31(4):257-262. doi:10.1177/1084822319856004
18. Aslani Z, Alimohammadi N, Taleghani F, Khorasani P. Nurses' empowerment in self-care education to stroke patients: an action research study. *Int J Community Based Nurs Midwifery*. 2016;4(4):329-338.
19. Fryer CE, Luker JA, McDonnell MN, Hillier SL. Self-management programs for quality of life in people with stroke. *Stroke*. 2016;47(12):e266-e267. doi:10.1161/STROKEAHA.116.015253
20. Kristine Stage Pedersen S, Lillelund Sørensen S, Holm Stabel H, Brunner I, Pallesen H. Effect of self-management support for elderly people post-stroke: a systematic review. *Geriatrics*. 2020;5(2):38. doi:10.3390/geriatrics5020038
21. Alligood MR. *Nursing Theorists and Their Work*. 8th ed. Elsevier; 2014. 1-765 p.
22. DeLaune SC, Ladner PK. *Fundamental of Nursing: Standards & Practice*. Delmar, Cengage Learning; 2011. 1-1438 p.
23. Saadatnia M, Shahnazi H, Khorvash F, Esteki-Ghashghaei F. The impact of home-based exercise rehabilitation on functional capacity in patients with acute ischemic stroke: a randomized controlled trial. *Home Heal Care Manag Pract*. 2020;32(3):141-147. doi:10.1177/1084822319895982
24. Perry AG, Potter PA. *Nursing Skills & Procedures*. 8th ed. Elsevier; 2015. 1-683 p.
25. Kim EH, Jang MC, Seo JP, Jang SH, Song JC, Jo HM. The effect of a hand-stretching device during the management of spasticity in chronic hemiparetic stroke patients. *Ann Rehabil Med*. 2013;37(2):235-240. doi:10.5535/arm.2013.37.2.235
26. Agonwardi A, Budi H. Pengaruh Pendidikan Kesehatan Tentang Latihan Range of Motion (ROM) Terhadap Keterampilan Keluarga Dalam Melakukan ROM Pada Pasien Stroke Di Bangsal Syaraf RSUP Dr M.Jamil Padang Tahun 2013. *J Endur*. 2016;1(1):47. doi:10.22216/jen.v1i1.1030
27. Rosmawati R, Manan WA. The evaluation of supportive-developmental nursing program on self-care practices of persons

- with type 2 diabetes at the health centre in Bachok, Kelantan. *Self Care Depend Care Nurs*. 2013;20(1):16-22.
28. Zarandi FM, Raiesifar A, Ebadi A. The effect of orem's self-care model on quality of life in patients with migraine: a randomized clinical trial. *Acta Med Iran*. 2016;54(3):159-164.
  29. Braga ACM, Pinto A. Home caregivers training program for amyotrophic lateral sclerosis: insights from a pilot project. *Home Health Care Manag Pract*. 2018;30(2):70-75. doi:10.1177/1084822317753830
  30. Oupra R, Griffiths R, Pryor J, Mott S. Effectiveness of supportive educative learning programme on the level of strain experienced by caregivers of stroke patients in Thailand. *Health Soc Care Community*. 2010;18(1):10-20. doi:10.1111/j.1365-2524.2009.00865.x
  31. Appil R, Sjattar EL, Yusuf S, Kadir K. Effect of family empowerment on HbA1c levels and healing of diabetic foot ulcers. *Int J Low Extrem Wounds*. Published online June 11, 2020. doi:10.1177/1534734620930120
  32. Sjattar EL, Nurrahmah E, Bahar B, Wahyuni S. Pengaruh penerapan model keluarga untuk keluarga terhadap kemandirian keluarga merawat penderita TB paru peserta DOTS di Makassar. *JST Kesehatan*. 2011;1(1):1-9.
  33. Kurtz C, Schmidt N. Conceptualizing cognitive-behavioral therapy as a supportive-educative nursing system for patients with insomnia. *Off J Orem Int Soc Nurs Sci Scholarsh*. 2016;22(1):14-21.
  34. Sürücü HA, Kizilci S. Use of orem's self-care deficit nursing theory in the self-management education of patients with type 2: a case study. *Self Care Depend Care Nurs*. 2012;19(1):53-59. doi:10.13140/RG.2.2.16843.13604
  35. JTECH Medical Commander EM. *Commander Echo Instructions for Use*. JTECH Medical Commander EM; 2017:4-69.
  36. Omar MTA, Alghadir A, Al Baker S. Norms for hand grip strength in children aged 6-12 years in Saudi Arabia. *Dev Neurorehabil*. 2015;18(1):59-64. doi:10.3109/17518423.2014.967878
  37. Knudsen AW, Naver A, Bisgaard K, et al. Nutrition impact symptoms, handgrip strength and nutritional risk in hospitalized patients with gastroenterological and liver diseases. *Scand J Gastroenterol*. 2015;50(10):1191-1198. doi:10.3109/00365521.2015.1028994
  38. Shogenji M, Kato M, Kitaoka K, Asakawa Y, Uemura S. Longitudinal study examined to physiological and psychological transition for the development of sensing indicators of daily livings among solitude elderly persons. *Journal of the Tsuruma Health Science Society Kanazawa University*. 2016;40(2):95-99.
  39. Moriello C, Finch L, Mayo NE. Relationship between muscle strength and functional walking capacity among people with stroke. *J Rehabil Res Dev*. 2011;48(3):267-275. doi:10.1682/jrrd.2010.04.0066
  40. Kimura M, Ogata Y, Akebi T, Ochi M, Hachisuka K, Saeki S. Development and reliability of a hand-held dynamometer device to measure the ankle dorsiflexor muscle strength. *J Rehabil Assist Technol Eng*. 2018;5:2055668318802558. doi:10.1177/2055668318802558
  41. Almhawi KA, Mathiowetz VG, White M, Robert C. Efficacy of occupational therapy task-oriented approach in upper extremity post-stroke rehabilitation. *Occup Ther Int*. 2016;23(4):444-456. doi:10.1002/oti.1447
  42. Nomura T, Ishiguro T, Ohira M, Oka H, Ikeda Y. Isometric knee extension force in Japanese type 2 diabetic patients without apparent diabetic polyneuropathy: data from the multicenter survey of the isometric lower extremity strength in type 2 diabetes study. *SAGE Open Med*. 2019;7:2050312118823412. doi:10.1177/2050312118823412
  43. Ishak NH, Mohd Yusoff SS, Rahman RA, Kadir AA. Diabetes self-care and its associated factors among elderly diabetes in primary care. *J Taibah Univ Med Sci*. 2017;12(6):504-511. doi:10.1016/j.jtumed.2017.03.008
  44. Yu M, Chair SY, Chan CWH, Choi KC. A health education booklet and telephone follow-ups can improve medication adherence, health-related quality of life, and psychological status of patients with heart failure. *Heart Lung*. 2015;44(5):400-407. doi:10.1016/j.hrtlng.2015.05.004
  45. Emmerson KB, Harding KE, Taylor NF. Home exercise programmes supported by video and automated reminders compared with standard paper-based home exercise programmes in patients with stroke: a randomized controlled trial. *Clin Rehabil*. 2017;31(8):1068-1077. doi:10.1177/0269215516680856
  46. Donoso Brown EV, Fichter R. Home programs for upper extremity recovery post-stroke: a survey of occupational therapy practitioners. *Top Stroke Rehabil*. 2017;24(8):573-578. doi:10.1080/10749357.2017.1366013
  47. Aguiar LT, Brennar L, Camargo A, et al. Strength of the lower limb and trunk muscles is associated with gait speed in individuals with sub-acute stroke: a cross-sectional study. *Braz J Phys Ther*. 2018;22(6):459-466. doi:10.1016/j.bjpt.2018.03.001
  48. Franceschini M, La Porta F, Agosti M, Massucci M. Is health-related-quality of life of stroke patients influenced by neurological impairments at one year after stroke? *Eur J Phys Rehabil Med*. 2010;46(3):389-399.
  49. Miller KK, Porter RE, DeBaun-Sprague E, Van Puymbroeck M, Schmid AA. Exercise after stroke: patient adherence and beliefs after discharge from rehabilitation. *Top Stroke Rehabil*. 2017;24(2):142-148. doi:10.1080/10749357.2016.1200292
  50. Parellangi A, Haroen H, Meilianingsih L. Peningkatan Kemandirian Keluarga Setelah Intervensi Pelayanan Home Care. *Husada Mahakam J Kesehatan*. 2012;3(3):114-122.
  51. Khallaf ME, Ameer MA, Fayed EE. Effect of task specific training and wrist-fingers extension splint on hand joints range of motion and function after stroke. *NeuroRehabilitation*. 2017;41(2):437-444. doi:10.3233/NRE-162128
  52. Lin LF, Lin YJ, Lin ZH, Chuang LY, Hsu WC, Lin YH. Feasibility and efficacy of wearable devices for upper limb rehabilitation in patients with chronic stroke: a randomized controlled pilot study. *Eur J Phys Rehabil Med*. 2018;54(3):388-396. doi:10.23736/S1973-9087.17.04691-3
  53. Shahbazian H, Yazdanpanah L, Latifi SM. Risk assessment of patients with diabetes for foot ulcers according to risk classification consensus of international working group on diabetic foot (IWGDF). *Pak J Med Sci*. 2013;29(3):730-734. doi:10.12669/pjms.293.3473
  54. Russo RR, Bum MB, Ismaili SK, et al. How does level and type of experience affect measurement of joint range of motion? *J Surg Educ*. 2018;75(3):739-748. doi:10.1016/j.jsurg.2017.09.009

# e\_of\_Motion\_Exercise\_for\_Post-stroke\_Patients\_\_A\_Pilot\_Study.pdf

## ORIGINALITY REPORT

18%

SIMILARITY INDEX

15%

INTERNET SOURCES

12%

PUBLICATIONS

5%

STUDENT PAPERS

## PRIMARY SOURCES

1	<a href="http://journals.sagepub.com">journals.sagepub.com</a> Internet Source	1%
2	<a href="http://zenodo.org">zenodo.org</a> Internet Source	1%
3	<a href="http://cyberleninka.org">cyberleninka.org</a> Internet Source	1%
4	Submitted to Caritas Institute of Higher Education Student Paper	1%
5	<a href="http://itma.ir">itma.ir</a> Internet Source	1%
6	<a href="http://kanazawa-u.repo.nii.ac.jp">kanazawa-u.repo.nii.ac.jp</a> Internet Source	1%
7	Submitted to University of Sydney Student Paper	1%
8	<a href="http://jneuroengrehab.biomedcentral.com">jneuroengrehab.biomedcentral.com</a> Internet Source	1%

Submitted to Graceland University

9

Student Paper

&lt;1 %

10

Rasnah Appil, Elly Lilianty Sjattar, Saldy Yusuf, Kasmawati Kadir. "Effect of Family Empowerment on HbA1c Levels and Healing of Diabetic Foot Ulcers", The International Journal of Lower Extremity Wounds, 2020

Publication

&lt;1 %

11

[garuda.ristekdikti.go.id](http://garuda.ristekdikti.go.id)

Internet Source

&lt;1 %

12

Submitted to University of Bath

Student Paper

&lt;1 %

13

[internationaljournalofcaringsciences.org](http://internationaljournalofcaringsciences.org)

Internet Source

&lt;1 %

14

[link.springer.com](http://link.springer.com)

Internet Source

&lt;1 %

15

[bmcpediatr.biomedcentral.com](http://bmcpediatr.biomedcentral.com)

Internet Source

&lt;1 %

16

Chandra Irawan, Mardiyono Mardiyono, Suharto Suharto, Aris Santjaka.

"COMBINATION OF HYPNOSIS THERAPY AND RANGE OF MOTION EXERCISE ON UPPER-EXTREMITY MUSCLE STRENGTH IN PATIENTS WITH NON-HEMORRHAGIC STROKE", Belitung Nursing Journal, 2018

Publication

&lt;1 %

17	<a href="https://pdfs.semanticscholar.org">pdfs.semanticscholar.org</a> Internet Source	<1 %
18	<a href="http://www.rbf-bjpt.org.br">www.rbf-bjpt.org.br</a> Internet Source	<1 %
19	<a href="http://www.fmh.org">www.fmh.org</a> Internet Source	<1 %
20	<a href="http://acamedicine.org">acamedicine.org</a> Internet Source	<1 %
21	<a href="http://hdl.handle.net">hdl.handle.net</a> Internet Source	<1 %
22	<a href="http://Www.dovepress.com">Www.dovepress.com</a> Internet Source	<1 %
23	Submitted to University of College Cork Student Paper	<1 %
24	<a href="http://eprints.nkums.ac.ir">eprints.nkums.ac.ir</a> Internet Source	<1 %
25	<a href="http://www.science.gov">www.science.gov</a> Internet Source	<1 %
26	<a href="http://ephysician.ir">ephysician.ir</a> Internet Source	<1 %
27	<a href="http://www.tandfonline.com">www.tandfonline.com</a> Internet Source	<1 %
28	<a href="http://journalmsr.com">journalmsr.com</a> Internet Source	<1 %

29	<a href="http://opus.lib.uts.edu.au">opus.lib.uts.edu.au</a> Internet Source	<1 %
30	<a href="http://academic.oup.com">academic.oup.com</a> Internet Source	<1 %
31	<a href="http://j.kafn.or.kr">j.kafn.or.kr</a> Internet Source	<1 %
32	<a href="http://jurnal.unissula.ac.id">jurnal.unissula.ac.id</a> Internet Source	<1 %
33	<a href="http://worldscientific.com">worldscientific.com</a> Internet Source	<1 %
34	<a href="http://www.arpjournals.com">www.arpjournals.com</a> Internet Source	<1 %
35	<a href="http://www.coursehero.com">www.coursehero.com</a> Internet Source	<1 %
36	<a href="http://www.rehab.research.va.gov">www.rehab.research.va.gov</a> Internet Source	<1 %
37	Mi Joo Choi, Hana Kim, Hyun-Wook Nah, Dong-Wha Kang. "Digital Therapeutics: Emerging New Therapy for Neurologic Deficits after Stroke", Journal of Stroke, 2019 Publication	<1 %
38	<a href="http://docplayer.net">docplayer.net</a> Internet Source	<1 %
39	Ahtisham Younas, Shannon Quennell. "Usefulness of nursing theory - guided	<1 %

practice: an integrative review", Scandinavian Journal of Caring Sciences, 2019

Publication

---

40

Larissa Tavares Aguiar, Júlia Caetano Martins, Sherindan Ayessa Ferreira de Brito, Camila Lima Gervásio Mendes et al. "Knee extensor muscles strength indicates global lower-limb strength in individuals who have suffered a stroke: A cross-sectional study", Brazilian Journal of Physical Therapy, 2018

Publication

---

<1 %

41

Mark Gotthelf, DeWayne Townsend, William Durfee. "A video game based hand grip system for measuring muscle force in children", Journal of NeuroEngineering and Rehabilitation, 2021

Publication

---

<1 %

42

Masafumi Nozoe, Hiroki Kubo, Masashi Kanai, Miho Yamamoto, Shinichi Shimada, Kyoshi Mase. "Sarcopenia risk and diabetes mellitus are independent factors for lower limb muscle strength in older patients with acute stroke: A cross-sectional study", Nutrition, 2020

Publication

---

<1 %

43

Nilay Arman, Ela Tarakci, Devrim Tarakci, Ozgur Kasapcopur. "Effects of Video Games-Based Task-Oriented Activity Training (Xbox 360 Kinect) on Activity Performance and

<1 %

Participation in Patients With Juvenile Idiopathic Arthritis", American Journal of Physical Medicine & Rehabilitation, 2019

Publication

44

[circ.ahajournals.org](http://circ.ahajournals.org)

Internet Source

<1 %

45

[downloads.hindawi.com](http://downloads.hindawi.com)

Internet Source

<1 %

46

[go.gale.com](http://go.gale.com)

Internet Source

<1 %

47

[revalidatiegeneeskunde.nl](http://revalidatiegeneeskunde.nl)

Internet Source

<1 %

48

[www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov)

Internet Source

<1 %

49

[www.researchsquare.com](http://www.researchsquare.com)

Internet Source

<1 %

50

Penny H. Feldman, Margaret V. McDonald, Nicole Onorato, Joel Stein, Olajide Williams. "Feasibility of deploying peer coaches to mentor frontline home health aides and promote mobility among individuals recovering from a stroke: pilot test of a randomized controlled trial", Pilot and Feasibility Studies, 2022

Publication

<1 %

51

[discovery.ucl.ac.uk](http://discovery.ucl.ac.uk)

<1 %

52

Guro B. Smedshaug, Jan I. Pedersen, Haakon E. Meyer. "Can vitamin D supplementation improve grip strength in elderly nursing home residents? A double-blinded controlled trial", Scandinavian Journal of Food and Nutrition, 2016

Publication

<1 %

53

S. Land. "Community Nursing in Latin America and the Caribbean", Home Health Care Management & Practice, 12/01/1998

Publication

<1 %

54

Xi Cheng, Chenggang Jin. "The Association Between Smoking and Health-Related Quality of Life Among Chinese Individuals Aged 40 Years and Older: A Cross-Sectional Study", Frontiers in Public Health, 2022

Publication

<1 %

Exclude quotes On

Exclude matches < 5 words

Exclude bibliography On