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# The Effectiveness of Acupressure and Warm Foot Soak Hydrotherapy on Increasing Muscle Strength and Range of Motion among Non-Hemorrhagic Stroke Patients

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**Abstract.** The decreasing function of the upper and lower extremities is a frequent complication in non-hemorrhagic stroke patients who experience hemiparesis. The study aimed to analyze the effectiveness of acupressure, and warm foot soak hydrotherapy on increasing muscle strength and range of motion among non-hemorrhagic stroke patients. The Randomized control trial (RCT) was applied in this study. We select the samples using simple random sampling with 30 respondents. The data was analyzed using Paired t-test and an Independent t-test to determine the mean difference among the experimental and control groups. Independent t-test showed no significant difference p value >0.05 that the intervention and control groups were equally effective in increasing muscle strength and range of motion of the upper and lower extremities. However, the difference in the mean increase in muscle strength and range of motion in the intervention group was higher than in the control group. Acupressure with a warm foot soak hydrotherapy effectively increased muscle strength and range of motion of the upper extremities with the lower extremities in non-hemorrhagic post-stroke patients.

**Keywords**: acupressure, warm foot soak hydrotherapy, stroke, muscle strength, range of motion

## Introduction

Stroke is defined as a clinical syndrome with symptoms in the form of focal or global disturbances of brain function that can cause death or abnormalities that persist for more than 24 hours, without other causes except for vascular disorders. The cerebrovascular accident is due to blood flow to the brain or blood vessel rupture in the brain [(1)]. The clinical consequences depend on the region of the lesion in the brain and the volume of brain tissue damage. One of the clinical manifestations of stroke, such as contractures, could contribute to muscle weakness on the side contralateral to the lesion in the brain [(2).]

Stroke is one of the most common diseases that leads to permanent damage to the central nervous system. The high incidence and severity of stroke are so severe that it is considered the third most common cause of morbidity after cancer and heart disease(3). Based on data (WHO) World Health Organization, Stroke is one of the top three causes of death globally, among other dangerous diseases such as cancer and heart disease. Every year stroke kills more than 160,000 Americans. 75% of patients with stroke in America have paralysis and lose their jobs. In Europe, stroke cases are found around 650,000 cases each year. In England, stroke ranks second at the age above 60 years and fifth at 15-59 years. Stroke is the number 1 cause of severe permanent disability worldwide. For developing countries or Asia, the incidence of hemorrhagic stroke is around 30%, and ischemic stroke is 70%. Ischemic stroke is caused, among others, by brain thrombosis (thickening of the arteries) 60%, embolism 5% (sudden blockage), and others 35%(4). The 2018 Basic health research data survey is based on a doctor's diagnosis of stroke in a population aged >15 years, 10.9% of the Indonesian people. The first highest prevalence was in the province of East Kalimantan, 14.7%. The Province of the Special Region of Yogyakarta 14.6% and followed by the area of North Sulawesi with 14.2%. In contrast, in Central Java province, the prevalence of non-communicable diseases such as hypertension was 57.10%, diabetes mellitus 20.57%, heart disease 9.82%, asthma 4.58%, stroke 3.09%, cancer/tumor 0.81%. It was indicated that the prevalence of non-communicable diseases in Central Java is highest, namely hypertension, DM, heart disease, asthma, and stroke(5).

Health problems that arise due to stroke vary widely, depending on the brain area that experiences infarction or tissue death and rupture of brain blood vessels that causes brain function disorders and results in bleeding in the brain. About 50 million stroke patients worldwide experience physical or motor, cognitive, and emotional problems. Stroke patients, in general, have problems fulfilling daily activities because stroke patients have weak motor skills, especially elderly patients. The decrease in daily activities was also evidenced by a study conducted by Pei on 152 respondents who stated that 8.6% of respondents had mild disabilities, 38.8% of respondents had moderate disabilities, and 52.6% of respondents experienced severe disabilities after a stroke. As many as 80% of stroke patients go home with varying symptoms, such as hemiparesis, dysarthria, dysphagia, depression, aphasia, and others, so that patients cannot perform daily activities [(6, 7)].

Stroke can have an impact on extremity dysfunction. This limb dysfunction is the most common functional disorder that can decrease muscle strength and range of motion. Several factors that cause limb dysfunction are contractures and deformity, loss of motor control, weakness, loss of postural control to support upper extremity control, loss of joint biomechanical alignment, and ineffective movement patterns.

Movement of the extremities is fundamental to the effective use of the hands to perform activities of daily living. Upper extremity pathology, especially the shoulder, is prevalent in patients with hemiplegia after a stroke. According to Van Ouwenaller et al., shoulder pathology occurs in up to 85% of patients with spasticity and up to 18% of patients with flaccid symptoms. To prevent and maximize motor healing at the onset of hemiplegia, preventive measures are

needed that need to be initiated by all members of the rehabilitation team, including nurses, therapists, and medical personnel(8).

One of the nursing actions in self-care includes Range Of Motion in stroke patients. A study from Ika regarding the implementation of ROM on motor skills in post-stroke showed that providing 2 times a day for 7 days of ROM was a significant effect of ROM exercise on motor skills in post-stroke patients with $p < 0.05$. Giving ROM twice a day with 45-60 minutes for seven days of practice showed a significant increase in muscle strength(9). In addition, another study also reported that the ROM exercises two times for seven days improved the limb muscle strength in stroke patients, with a p-value in the upper limb was 0.002 and lower extremities ($p=0.006$). It was indicated that ROM exercises could increase the muscle strength of the extremities in stroke patients. Rehabilitation that has been carried out in stroke patients to overcome paralysis is with ROM. The effect of ROM produces energy for contraction and increases extremity smooth muscle tone. To help streamline or optimize the ROM mechanism, therapy is needed to improve and increase circulation to help deliver energy to all muscles[10].

Acupressure is a part of traditional Chinese medicine based on the theory of Meridian acupressure with theory Ying/Yang in eastern philosophy. In Adam's study, acupressure intervention on muscle strength and range of motion in the upper extremities in post-hospitalized stroke patients. The intervention group was given acupressure every day for 10 minutes for seven days, showing a significant difference in muscle strength ($p=0.001$) and upper limb range of motion between the intervention and control groups ($p=0.000$).

A study conducted by Asmawariza found a significant difference between the increase in upper muscle strength in the experimental group and the control group on days 3, 4, 5, 6, 7. The experimental group had a higher muscle strength improvement (mean 3.95) than the control group (mean 2.16). The increase in upper muscle strength was 61.27%, with an effect size of 1.88. In contrast, the difference between the increase in lower extremity muscle strength in the experimental group and the control group on days 3, 4, 5, 6, 7. the experimental group had a higher level of muscle strength than the control group. The increase in lower muscle strength was 61.27%, with an effect size of 2.53[11].

In Asmawariza's study, it has shown the effectiveness of 14 acupressure points. Researchers found that not all of the 14 acupressure points affect muscle strength and range of motion. The findings found the use of acupressure techniques in increasing muscle strength and range of motion of the upper and lower extremities in non-hemorrhagic stroke patients. in any hospital in Indonesia, both during and after undergoing a period of hospitalization. Nurses rarely use acupressure as a therapy to prevent and treat upper and lower extremity complications in non-hemorrhagic stroke patients, even though acupressure is an action that nurses can take. Acupressure is one of the actions that has been recognized as one of the nursing actions in Nursing Intervention Classifications. In fact, according to Dupler, acupressure is an effective therapy both for prevention and to treat various symptoms and is easy to learn and can be given quickly, cheaply. Warm water is one of the therapeutic media that can be used for treatment where the hydrostatic, hydrodynamic effects and warm temperatures make blood circulation in the body smooth.

Warm water foot bath hydrotherapy is a series of efficient health treatments through water's heating, mechanical, and chemical actions. The mechanism of action provides heat transfer from warm water into the body through the soles of the feet. The work of warm water is basically to increase circulation (cells) by channeling energy through convection (irrigation through a liquid medium) so that blood vessels dilate throughout the body, which impacts increasing muscle strength.

The research from Setiyawan et al. found an effect of warm water foot soak on muscle strength of non-hemorrhagic stroke patients with p-value = 0.000, and there was a difference between the control group and the control group. The intervention group of non-hemorrhagic stroke patients with p-value = 0.008. There is an effect of warm water foot soak hydrotherapy on the muscle strength of the upper extremity of non-hemorrhagic stroke patients.[12]

In the research of Setiawan. et al. (2019) shown the effect of warm foot soak hydrotherapy. However, researchers found the impact of a warm foot soak hydrotherapy only to assess the upper extremities' muscle strength and range of motion. Researchers have not seen data on the use of warm foot soak hydrotherapy for measures the value of muscle strength and range of motion of the lower extremities.

Based on acupressure's working mechanism, which aims to improve the flow of Qi in the body (vital energy and is the essential element of all forms of movement). It is necessary to have therapy to increase circulation to help deliver energy where this therapy can be found in warm water soaking hydrotherapy interventions. Apart from the findings of researchers regarding the study of 14 acupressure points, not all of which affect muscle strength and range of motion and the working mechanism of acupressure and until now, there has been no research that examines acupressure explicitly in intervention with warm water foot soak intervention on muscle strength and range of motion in Non-hemorrhagic stroke patients, it is necessary to research "Effectiveness of Acupressure and warm foot soak hydrotherapy on Increasing Muscle Strength and Range of Motion in Non-Hemorrhagic Stroke Patients."

## Objective

The study aimed to analyze the effectiveness of acupressure, and warm foot soak hydrotherapy on increasing muscle strength and range of motion in non-hemorrhagic stroke patients.

## Method

A randomized control trial, pre-test, and post-test with control group was applied in this study. The intervention group received the acupressure therapy with warm foot soak hydrotherapy. In contrast, the control group received only the acupressure therapy without warm foot soak hydrotherapy. The acupressure therapy was administered at points GV 20, Li 4, ST 36, and Ki 1, using fingers 30 times for each point, then hydrotherapy with warm foot soaks for 20 minutes 3 times a day for four days. A goniometer measured the assessment of muscle strength using observation using guidelines for assessing muscle strength and range of motion. The respondent's muscle strength and range of motion were evaluated before and after treatment (pre-test and post-test).

The population in this study were all non-hemorrhagic stroke patients who were hospitalized at the Praya Regional General Hospital. Determination of the minimum sample size using probability sampling technique with simple random sampling and based on inclusion and exclusion criteria. Thirty respondents were divided into two groups: the intervention group (acupressure with warm foot soak hydrotherapy) and 15 in the control group (acupressure without warm foot soak hydrotherapy).

In this study, researchers collected data using observation, identification, and interviews. The collected data were analyzed through the IBM SPSS version 21.0 program and continued with a different test, namely the parametric test (Paired t-test and independent t-test). The processed data is used as the basis for discussing the statement problem, which is then presented in tabular form so that conclusions can be drawn.

## Results

### Characteristic of respondents

Table 1 showed the characteristic of respondents. The findings presented that the mean age among the intervention group was 57.40 and the control group was 57.93 years old. More than half of the respondents were male (66.7%). Almost half of the respondents graduated from senior high school (46.7%). Most of the respondents had a stroke for the first attack (73.3%)

**Table 1 Characteristic of respondents**

| Variable | Group | | | | P |
|---|---|---|---|---|---|
| | Intervention | | Control | | |
| | N | % | N | % | |
| **Age (Mean ± SD)** | (57.40 ± 0.799) | (57.93 ± 0.799) | | | 0.658 |
| 40-50 | 2 | 13.3 | 3 | 20.0 | |
| 51-60 | 8 | 53.3 | 5 | 33.3 | |
| 61-70 | 4 | 26.7 | 7 | 46.7 | |
| 71-80 | 1 | 6.7 | 0 | 0 | |
| Total | 15 | 100 | 15 | 100 | |
| **Gender** | | | | | |
| Male | 10 | 66.7 | 11 | 73.3 | 0.852 |
| Female | 5 | 33.3 | 4 | 26.7 | |
| Total | 15 | 100 | 15 | 100 | |
| **Education** | | | | | |
| Primary school | 1 | 6.7 | 1 | 6.7 | |
| Junior high school | 5 | 33.3 | 4 | 26.7 | |
| Senior High School | 7 | 46.7 | 8 | 53.3 | 0.436 |
| Bachelor degree | 1 | 6.7 | 1 | 6.7 | |
| No school | 1 | 6.7 | 1 | 6.7 | |
| Total | 15 | 100 | 30 | 100 | |
| **Stroke Frequency** | | | | | |
| first attack | 11 | 73.3 | 11 | 73.3 | 0.381 |
| second attack | 4 | 26.7 | 4 | 26.7 | |
| Total | 15 | 100 | 15 | 100 | |

**Homogeneity Test*

### Mean difference of muscle strength of the upper and lower extremities before and after treatment in the intervention group and control group

Table 2 showed the mean difference of muscle strength of the upper and lower extremities before and after treatment in the intervention group and control group. The finding found that that there is a significant difference in the increase in upper and lower extremity muscle strength before and after acupressure and warm foot hydrotherapy treatment with a p-value <0.05 in the intervention group and the control group.

**Table 2 Mean difference of muscle strength of the upper and lower extremities before and after treatment in the intervention group and control group**

| Variables | Group | Pre-test Mean ± SD | Post Test Mean ± SD | Mean (Δ) | t | p |
|---|---|---|---|---|---|---|
| Upper extremity muscle strength | Intervention | 2.27±0.458 | 2.87±0,516 | 0.60 | 4.583 | 0.000 |
| | Control | 2.40±0.516 | 2.67±0,488 | 0.27 | 2.256 | 0.041 |
| Lower extremity muscle strength | Intervention | 2.67±0.488 | 3.67±0.507 | 3.60 | -7.246 | 0.000 |
| | Control | 2.67±0.488 | 3.13±0,704 | 3.07 | -3.500 | 0.004 |

**Paired t-test*

**Mean differences of muscle strength of the upper and lower extremities between the intervention group and the control group**

Table 3 showed the mean differences in muscle strength of the upper and lower extremities between the intervention group and the control group. The findings found that there is no difference in the increase in muscle strength of the upper and lower extremities between the intervention group and control group significantly with a p-value >0.05

**Table 3 Mean differences of muscle strength of the upper and lower extremities between the intervention group and the control group**

| Variables | Intervention | Control | Mean Difference | t | P |
|---|---|---|---|---|---|
| | Mean ± SD | Mean ± SD | | | |
| Upper extremity muscle strength | 2.87±0.516 | 2.67±0.488 | 0.20 | 1.090 | 0.285 |
| Delta Upper extremity muscle strength | 0.60 0.507 | 0.27 0.457 | 0.33 | 1.890 | 0.069 |
| Lower extremity muscle strength | 3.67±0.507 | 3.13±0.704 | 0.54 | 2.323 | 0.282 |
| Delta Lower extremity muscle strength | 1.000 0.534 | 0.46 0.516 | 0.54 | 2.779 | 0.061 |

**Independent t test*

**Mean differences of range of motion of the upper and lower extremities before and after treatment in the intervention group and control group**

table 4 shows a significant difference in the increase in the range of motion of the upper and lower extremities before and after acupressure and warm foot hydrotherapy treatment with a p-value <0.05 in the intervention group and the control group.

**Table 4.Mean differences of range of motion of the upper and lower extremities before and after treatment in the intervention group and control group**

| Variables | Group | Pre-test | Post Test | Mean | t | p |
|---|---|---|---|---|---|---|
| | | Mean ± SD | Mean ± SD | (Δ) | | |
| Upper extremity range of motion | Intervention | 67.07±2.789 | 71.73±4.114 | 4.66 | -6.139 | 0.000 |
| | Control | 68.13±3.314 | 70.93±4.131 | 2.8 | -4.090 | 0.001 |
| Lower extremity range of motion | Intervention | 71.20±3.098 | 75.20±3.895 | 4 | -5.429 | 0.000 |
| | Control | 71.73±2.987 | 74.53±4.673 | 2.8 | -3.971 | 0.001 |

**Paired t-test*

**Mean difference of range of motion of the upper and lower extremities between the intervention group and the control group**

Based on table 5 shows that there is no difference in the increase in the range of motion of the upper and lower extremities between the intervention group and the control group significantly with a p-value >0.05.

**Table 5 Mean difference of range of motion of the upper and lower extremities between the intervention group and the control group**

| Variables | Intervention | Control | Mean Difference | t | P |
|---|---|---|---|---|---|
| | Mean ± SD | Mean ± SD | | | |
| Upper extremity range of motion | 71.73±4.114 | 70.93±4.131 | 0.80 | 0.531 | 0.941 |
| Delta Upper extremity range of motion | 4.66 2.943 | 2.80 2.651 | 1.86 | 1.825 | 0.832 |
| Lower extremity range of motion | 75.20±3.895 | 74.53±4.673 | 0.67 | 0.425 | 0.530 |
| Delta Lower extremity range of motion | 4.00 2.853 | 2.80 2.730 | 1.20 | 1.177 | 0.554 |

**Independent t-test*

## Discussion

### Acupressure and warm foot soak hydrotherapy increase muscle strength in the upper and lower extremities.

The Independent analysis t-test showed that the mean value of muscle strength between the intervention and control groups was not significantly different, with a p-value of 0.069 lower extremities and a p-value of 0.061 for lower extremities. It was indicated that acupressure with a warm foot soaks hydrotherapy in the intervention group and acupressure therapy in the control group was equally effective in increasing upper and lower extremity muscle strength.

The presence of many nerve endings and blood vessels around the acupuncture points will amplify the response. Mast cells release histamine, heparin, and kinin prosthesis, which cause vasodilation. Histamine causes the release of nitric oxide from the vascular endothelium, which is a mediator of various cardiovascular, neurological, immune, digestive, and reproductive reactions. Mast cells will also release platelet-activating factor (PAF), followed by the release of serotonin from platelets. Serotonin stimulates nociceptors themselves and increases nociceptor response to bradykinin. Bradykinin is a potent vasodilator that causes an increase in vascular permeability[13].

The stimulation given by hydrotherapy foot soak in warm water will cause cells to experience vasodilation, resulting in smooth blood flow and bringing more nutrients and oxygen to brain cells and muscles to get adequate nutrition, including calcium and potassium. The increase in calcium ions in the cytosol occurs due to the release of more and more ions from the sarcoplasmic reticulum, potassium ions in the muscle function to carry out muscle action potentials so that muscle mass can be maintained and muscle work can increase. As a result of smooth blood flow can increase the supply of oxygen to muscle cells [14].

A study showed that acupressure and warm foot soak hydrotherapy had not increased upper and lower extremity muscle strength [11]. the study of warm foot soaks hydrotherapy on muscle strength led by Setiawan et al. (2019)[12].

Acupressure study of 14 points on 38 post-stroke patients on day 4 for seven days with a duration of 5 minutes pressing each point. This type of research was quasi-experimental using the intervention group and the control group (n control = 19 and n intervention = 19) who experienced muscle weakness of the upper and lower extremities. The results showed that there was a significant difference between the increase in upper muscle strength in the experimental group and the control group on days 3, 4, 5, 6, 7 (p=0.010, p=0.000, p=0.000, p=0.000, p=0.000). Although both groups had improvement, the experimental group had a higher level of muscle strength improvement (delta value 1.00 on day 4) in upper extremity muscle strength and (delta value 1.00 on day 4) in lower extremity muscle strength. The increase in lower muscle strength was 61.27%, with an effect size of 2.53[11].

Research on hydrotherapy with warm foot baths increased muscle strength. This study used a research quasi-experimental design with an approach nonequivalent control group pre-test and post-test on 40 respondents, data analysis using the Wilcoxon and Mann Whitney test. The results showed that there was an effect of foot soak in warm water on the muscle strength of non-hemorrhagic stroke patients with p-value = 0.000, and there was a difference between the control group and the intervention group of non-hemorrhagic stroke patients with p = 0.008 or p = 0.000[12].

Research Interventions with acupressure and hydrotherapy with warm foot baths carried out for four days (12 times acupressure with a duration of 3 minutes each point, 12 warm foot soaks with a period of 20 minutes each immersion) can increase the average value of muscle strength in patients with non-hemorrhagic stroke with a p-value = 0.000 in the upper extremity. The mean value of upper extremity muscle strength in the intervention group before being given treatment was 2.27. After being given treatment, the average upper extremity muscle strength was 2.87, with a mean delta value of 0.60. In contrast, the mean value of lower extremity muscle strength in the intervention group before being given treatment was 2.67. After being given treatment, the average upper extremity muscle strength was 3.67, with a mean delta value of 1.00.

### The effectiveness of acupressure and warm foot soak hydrotherapy on increasing the range of motion of the upper and lower extremities.

The Independent analysis t-test showed that the mean range of motion between the intervention group and the control group was not significantly different, with a p-value of 0.832 for the lower extremities and a p-value of 0.832 for the lower extremities. 0.554 lower extremities, meaning that acupressure with warm foot soak hydrotherapy in the intervention group and acupressure therapy

in the control group were equally effective in increasing the range of motion of the upper and lower extremities.

Giving acupressure at the meridian points can improve the circulation of qi and blood in the body to relax hardened muscles and stimulate natural repair of skeletal abnormalities, and range of motion can be increased. In addition, it was also stated that giving acupressure therapy will harmonize the flow of qi and blood so that it will relax spasms and relieve pain in the joints because it stimulates the release of endorphins[15].

Warm foot soak hydrotherapy is a therapeutic medium that can be used for treatment. Its hydrostatic, hydrodynamic effects and warm temperatures make blood circulation in the body smooth. Besides accelerating blood circulation, warm water also provides a calming effect for the body[16].

Doing hydrotherapy warm water foot soak provides heat transfer from warm water into the body through the soles of the feet. The work of warm water is basically to increase circulation (cells) by channeling energy through convection (irrigation through a liquid medium) so that blood vessels dilate throughout the body, which impacts increasing muscle strength[16].

Oxygen must be supplied to the muscles by blood to produce ATP in the muscle mitochondria. Mitochondria play a role in the process of making ATP which is needed by muscles to contract. Muscle contraction is initiated by the release of acetylcholine which causes an action potential or stimulus to propagate across the surface of the muscle membrane. This causes calcium ions to be released in large quantities into the sarcoplasm to maintain muscle mass. Muscle work can increase due to increased upper extremity muscle strength[16]. Hydrotherapy foot soak in warm water can improve blood circulation so that it can help to deliver energy to all muscles. Stimulation through neuromuscular will increase the excitability of nerve fibers in the extremities, especially the parasympathetic nerves. It also stimulates the production of acetylcholine, resulting in contraction. The mechanism through mucus, the exceptionally smooth muscle of the extremities, will increase metabolism in the mitochondria to produce ATP, which is utilized by the muscles of the extremities as energy for contraction and increase the smooth muscles of the extremities[17].

Another study also reported that acupressure and warm foot bath hydrotherapy have not been effective on upper extremities[15].

A 6-point acupressure study on 34 respondents used a quasi-experimental design with a pre-test – post-test design approach. The results showed a significant difference in muscle strength and range of motion of the upper extremities between the intervention group and the control group (p=0.001 and p=0.000). There was a significant change in the mean range of motion in the intervention group between before and after acupressure. The average range of motion before acupressure was 75.33, with a standard deviation of 6.89. after receiving acupressure was 84.80 with a standard deviation of 5.66. Meanwhile, average range of motion in the control group showed a decrease of 76.86 with a standard deviation of 2.17, which was previously 77.03 with a standard deviation of 2.17[15].

Research Intervention of acupressure and warm foot soak hydrotherapy for four days (12 times acupressure with a duration of 3 minutes each point, 12 times warm foot soak with a period of 20 minutes each immersion) can increase the average value of the range of motion of patients with non-hemorrhagic stroke with value p= 0.000 in the upper extremity. The mean value of the upper extremity range of motion in the intervention group before receiving treatment was 67.07. The upper extremity's average range of motion after being given treatment was 71.73, with a mean difference of 4.66. Meanwhile, in the control group, the average range of motion of the upper extremities before treatment was 68.13, and the average range of motion of the upper extremities after treatment was 70.93, with a mean difference of 2.80. While the average value of the range of motion with non-hemorrhagic stroke in the lower extremities. The mean value of the range of motion of the lower extremities in the intervention group before being given treatment was 71.20, and the average muscle strength of the upper extremities after being given treatment was 75.20, with a mean difference of 4.66. While in the control group, the mean range of motion of the lower extremities before treatment was 71.73, and the mean range of motion of the lower extremities after treatment was 74.53, with a mean difference of 2.80.

## Conclusion

In conclusion, the average increase in upper and lower extremity muscle strength between the intervention and control groups has the same effectiveness with a p-value >0.05. Meanwhile, the range of motion for upper and lower extremities between the intervention and control groups also has the

same effect with a p-value > 0.05. However, the difference in the mean increase in muscle strength and range of motion in the intervention group was higher than in the control group.

In conclusion, acupressure with warm foot bath hydrotherapy in the intervention group and acupressure without warm foot soak hydrotherapy in the control group increased muscle strength and range of motion of the upper and lower extremities.

## References


(1) Fatimah S, Muflihatin Sk. Analisis Praktik Klinik Keperawatan Pada Pasien Stroke Non Hemoragik (Snh) Dengan Intervensi Inovasi Latihan Hook Grip Terhadap Peningkatan Luas Gerak Sendi (Lgs) Jari Tangan Di Ruangan Stroke Center Afi Rsud Abdul Wahab Sjahranie Samarinda Tahun 2018. 2018.

(2) Tanjung R, Effendy E, Wahyuni Se. Hubungan Social Engagement Dengan Fungsi Kognitif Pada Pasien Pasca Stroke Di Rsud. Dr. Pirngadi Kota Medan. Journal Of Islamic Nursing. 2019;4(1):26-31.

(3) Warganegara E, Nur Nn. Faktor Risiko Perilaku Penyakit Tidak Menular. Jurnal Majority. 2016;5(2):88-94.

(4) Mahmudah M. Pemodelan Fungsi Transfer Pada Kasus Penyakit Jantung Koroner (Pjk) Yang Di Pengaruhi Oleh Hipertensi Esensial. Jurnal Ilmiah Kesehatan Media Husada. 2017;6(1):59-66.

(5) Kesehatan K, Penelitian B, Kesehatan P. Hasil Utama Riskesdas 2018. Jakarta [Id]: Balitbangkes Kementerian Kesehatan. 2018.

(6) Sofiatun I, Kristiyawati Sp, Purnomo Sec. Efektifitas Terapi Aiueo Dan Terapi The Token Test Terhadap Kemampuan Berbicara Pasien Stroke Yang Mengalami Afasia Motorik Di Rs Mardi Rahayu Kudus. Jurnal Ilmu Keperawatan Dan Kebidanan. 2016;8(2).

(7) Pertamita Dm, Hastuti Yd, Ropyanto Cb, Ulliya S. Hubungan Efikasi Diri Dengan Kemandirian Aktivitas Sehari-Hari Pada Pasien Stroke Di Rsud Tugurejo Semarang Dan Rsud Krmt Wongsonegoro: Faculty Of Medicine; 2017.

(8) Amirudin Z, Anonim T, Saleh R. Efek Kombinasi Antara Masase Frirage Dan Akupresur Terhadap Kekuatan Otot Ekstremitas Atas Pasien Pasca Stroke Iskemik. Jurnal Litbang Kota Pekalongan. 2018;14.

(9) Rahayu Kin. Pengaruh Pemberian Latihan Range Of Motion (Rom) Terhadap Kemampuan Motorik Pada Pasien Post Stroke Di Rsud Gambiran. Jurnal Keperawatan. 2016;6(2).

(10) Eka R. Pengaruh Latihan Rentang Gerak Terhadap Kekuatan Otot Pada Pasien Stroke Di Irna Non Bedah Saraf Rsup. Dr. M. Djamil Padang Tahun 2014: Universitas Andalas; 2015.

(11) Asmawariza Lh, Hadisaputro S, Mardiyono Dmwp, Parwati Dmw. Effect Of 14 Points Acupressure On Upper And Lower Extremity Muscle Strength Levels In Patients With Non-Hemorrhagic Stroke. Belitung Nursing. 2018:168.

(12) Setiyawan S, Pratiwi L, Rizqiea Ns. Pengaruh Hidroterapi Rendam Kaki Air Hangat Terhadap Kekuatan Otot Pada Pasien Stroke Non Hemoragik. Caring: Jurnal Keperawatan. 2019;8(1):15–22-15–22.

(13) Surya DO, Rekawati E, Widyatuti W. Akupresur Efektif Meningkatkan Nilai Ankle Brachial Index Pada Diabetisi. Jurnal Endurance. 2018;3(2):408-14.

(14) Asan Y. Perbedaan Tekanan Darah Sebelum Dan Sesudah Terapi Rendam Kaki Air Hangat Pada Lansia Di Upt Panti Sosial Penyantunan Lanjut Usia Budi Agung Kupang. CHMK Health Journal. 2016;1(1).

(15) Adam M, Nurachmah E, Waluyo A. Akupresur untuk Meningkatkan Kekuatan Otot dan Rentang Gerak Ekstremitas Atas pada Pasien Stroke. Jurnal Keperawatan Indonesia. 2014;17(3):81-7.

(16) Ulinnuha AA. Tekanan Darah Setelah Dilakukan Hidroterapi Rendam Kaki Air Hangat Pada Penderita Hipertensi Di Kelurahan Sambiroto Kota Semarang: Universitas Muhammadiyah Semarang; 2017.

(17) Rahayu E. Perbedaan risiko stroke berdasarkan faktor risiko biologi pada usia produktif. Jurnal Berkala Epidemiologi. 2015;4(1):113-25.

(18) Reese NB, Bandy WD. Joint range of motion and muscle length testing-E-book: Elsevier Health Sciences; 2016.

(19) Kim D-W, Lee DW, Schreiber J, I'm C-H, Kim H. Integrative Evaluation of Automated Massage Combined with Thermotherapy: Physical, Physiological, and Psychological Viewpoints. BioMed research international. 2016;2016.

(20) Hariyanto S, Rajin M, editors. The Effect of Acupuncture Therapy on Blood Pressure Decrease toward Elderly with Hypertension Diagnosis in Panti Werdha Mojopahit, Mojokerto, East Java, Indonesia. The 2nd Joint International Conferences; 2018.
(21) Iskandar M. The effectiveness of discharge planning and range of motion (ROM) training in increasing muscle strength of non-hemorrhagic stroke patients. GHMJ (Global Health Management Journal). 2018;2(3):57-62.