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## Original Articles

### The Effectiveness of the Acupuncture Reducing Point on the Improvement of Muscular Strength of Stroke Patients

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#### Abstract

**Background:** Stroke is a disease caused by disruption of blood flow to areas of the brain that are blocked in the cerebral or cervical arteries which result in decreased or even loss of function controlled by brain tissue. One of the effects caused by stroke is hemiparesis. Rehabilitation therapy plays an important role in a comprehensive restoration of bodily functions due to stroke, this program aims to restore function to reduce disability, one of the treatments is to use acupuncture meridian points.

**Purpose:** The purpose of this study was to determine the effectiveness of acupuncture meridian points in increasing muscle strength in stroke patients.

**Methods:** The research design used in this study was a randomized controlled trial (RCT) design. The number of samples of all stroke patients at the Holistic nursing therapy clinic in Probolinggo and the Healer School Jember Clinic that met the inclusion criteria from October 2020 to March 2021 were 270 respondents. Data collection techniques used observation sheets to assess muscle strength before and after the intervention of acupuncture meridian points in stroke patients. Data analysis used was the Wilcoxon test with a statistical significance value accepted if  $p < 0.05$ .

**Results:** The results of the data analysis of the intervention group showed a significant value of hand muscle strength ( $p = 0.003$ ;  $\alpha = 0.05$ ) and leg ( $p = 0.005$ ,  $\alpha = 0.05$ ) where ( $p < 0.05$ ) it can be concluded that there is a significant difference in strength. A muscle in the intervention group before and after being given acupuncture. The findings of this study suggest that there is a significant effect of acupuncture on lower and upper muscle strength.

**Conclusion:** In general, the use of acupuncture meridian points can increase muscle strength in stroke patients, so the use of acupuncture meridian points can provide benefits for restoring muscle strength in stroke patients.

## INTRODUCTION

Stroke is a disease caused by disruption of blood flow to areas of the brain that are blocked in the cerebral or cervical arteries, as a result, stroke can cause the death of brain tissue, which results in decreased and even loss of function controlled by the brain tissue (WHO, 2018). One of the effects caused by stroke is hemiparesis (muscle weakness on one side of the body), muscle weakness experienced by stroke patients can interfere with a person in carrying out daily activities (Brunner & Suddart, 2015)

According to the World Health Organization (WHO) in 2018, the prevalence of stroke was 13.7 million new cases each year and around 5.5 million deaths were due to stroke. In the United States, the incidence of stroke is approximately 795,000 cases per year (Miller et al., 2016). The prevalence of stroke in Indonesia has increased from 7% to 10.9%, it is estimated that every year there are 500,000 people affected by a stroke, and about 25% die, and the remaining 75% experience hemiparesis (muscle weakness on one side of the body). Meanwhile, in the East Java region, it was recorded (16%) or a total of 46,248 people had a stroke (RISKESDAS, 2018).

According to the Probolinggo health office in 2019, it was recorded 45.32% or as many as 3,530 people had a stroke. One of the complementary therapies that can be used to improve muscle strength function in stroke patients is acupuncture meridian point therapy. Acupuncture meridian points are a traditional Chinese medicine that involves piercing certain areas of the body with thin sharp needles, aimed at activating the flow of chi called meridians (Liu H, et al, 2017).

In stroke patients, the nerve tissue is closed and it is difficult to keep the circulation open. By stimulating the acupuncture meridian points at several acupuncture points it will open blood vessels and improve blood flow. In addition, acupuncture meridian point therapy can improve the segmental system of living nerve cells to find new, effective, spinal, local, nerve regeneration pathways, helping cells pass through damaged parts of the brain so that the body's condition improves in stroke patients, which is marked by an increase in strength. muscles (Panji, 2013).

In East Asia, acupuncture has played a major role in the treatment of stroke-related disorders (Zhang S, 2009). More and more doctors and patients in Western and developing countries have started to accept acupuncture with a merit point as an alternative therapy for various neurological diseases as rehabilitation therapy, in this case, is stroke (Pandian JD, 2011). Based on the above phenomena, the researchers were interested in researching on the effectiveness of acupuncture meridian points on the improvement of muscle stroke patients.

## METHODS

### *Study Design*

The research design used in this study used a randomized controlled trial (RCT) design.

***Settings***

The research was conducted in October 2020 to March 2021 at Holistic Nursing Therapy Clinic in Probolinggo and the Griya Acupuncture Clinic in Jember.

***Research Subject***

The population in this study were all stroke patients in Holistic Nursing Therapy Clinic in Probolinggo and the Griya Acupuncture Clinic in Jember a total of 280 patients. Sampling in this study based on the following criteria: inclusion criteria (Elderly who do not have hearing loss and visual impairment, Elderly who can read and write, willing to be respondents) and exclusion criteria (Elderly with dementia, mental disorders, and sick at the time of research). Sample of 40 respondents with simple random sampling.

***Instruments***

The instruments used in the study were to use the Manual Muscle Testing (MMT) to observe hand and foot strength.

***Data Collection***

Data collection techniques used observation sheets to assess muscle strength before day 1 and after day 14 were given acupuncture meridian point intervention in stroke patients.

***Data analysis***

Analysis of the data used in this study using the Wilcoxon test. Statistical significance was accepted if  $p < 0.05$ . All data analyzes were performed using SPSS 20.

***Ethical Consideration***

This research has been conducted research ethics test at Hafshawaty Pesantren Zainul Hasan College of Health Sciences

## RESULTS

### *Characteristics of Respondents*

Table 1. Description of of Respondents Based on Age, Gender and Stroke Type (n=270)

Variable	Frekuensi	
	n	%
<b>Age</b>		
36-45 years	36	13,3
46-55 years	126	46,7
56-65 years	108	40,0
Total	270	100
<b>Gender</b>		
Female	162	60
Male	108	40
Total	270	100
<b>Stoke Type</b>		
Hemorrhagic	90	33,3
Nonhemorrhagic	180	66,6
Total	270	100

Sources: Primary Data of Questionnaire, 2021

From the results of the study, it was found that the age was at most 46-55 years wherein the intervention group was 46.7% and in the control group it was 53.3%. A study conducted by Hauer (2017) divided the number of stroke respondents into 4 groups where the most age groups were at the age of 65-75 by 26% (Hauer, 2017). So that when viewed from this characteristic data, the average stroke sufferer is over 50 years of age, this is probably due to the decreased physiological function of the body organs, as well as the number of cases of hypertension which is a contributing factor at the age above 50 years, this is in line with research by Yao (2012) which explains the number of stroke patients who start from hypertension by 62% over the age of 50 years (Yao, et. al., 2012).

In addition, this study provides information on the number of men more than the number of women. An article also explains the differences in gender in stroke patients where the number of men is more than women (Hiraga, 2017).

The results showed that the majority of stroke types experienced non-hemorrhagic strokes 66.6%. Similar data also showed the number of hemorrhagic strokes in 144 patients and ischemic strokes in 359 patients, where 20% of hemorrhagic strokes were caused by ruptured blood vessels, and 80% of ischemic strokes followed by occlusion and blockage of brain vessels due to thrombosis or atherosclerosis (Ojaghihaghighi, S, et. el, 2017).

**Comparative Analysis**

Table 2. Comparative Analysis Of Pre and Post Hand Foot Muscle Strength in Stroke Patients

Variable		n	Median (minimum-maximums)	Mean±s.b	P value
<b>Hand Muscle Strength</b>	Pre	270	2,00(1-2)	1,80±0,414	0,003*
	Post	270	2,00(2-3)	2,40±0,507	
<b>Foot Muscle Strength</b>	Pre	270	2,00(1-2)	1,80±0,414	0,005*
	Post	270	2,00(2-4)	2,53±0,743	

The table presents muscle strength data measured on day 1 before intervention and day 14 which explains that there are differences in hand muscle strength ( $p$  0.003;  $\alpha$  0.05). While the data on leg muscle strength also got a significant value of 0.005 which explained that there was a difference between day 1 and day 14 after acupuncture was performed in the intervention group ( $p$  0.005,  $\alpha$  0.05).

**DISCUSSION**

Acupuncture is one of the oldest and most studied techniques in the treatment of stroke wherein a procedure involves inserting a fine needle into the skin or deeper tissue at the location of the body's acupoints. These needles can be manipulated manually, electrically, or with heat (Li, X, 2013). Recent research suggests that acupuncture points may be complex against muscle / skin nerves that contain high-density nerve endings. Where manual acupuncture or electroacupuncture (EA) at the active acupuncture meridian points to afferent fibers that send signals to the spinal cord (Zhao, 2008). in a study by pressing meridian points at six acupuncture points Large Intestine (LI) 15 or Jian Yu, Small Intestine (SI) 9 or Jian Zhen, Triple Energizer (TE) 14 or Jian Liao, Gallbladder (GB) 21 or Jian Jing, Small Intestine (SI) 11 or Tian Zong and Small Intestine (SI) 12 or Bing Feng will have a positive effect on increasing muscle strength and upper range of motion (Alamsyah, 2010; Shin & Lee 2007; You et al., 2017). There are four biomolecular and biophysical domains in the basic mechanism of biological reactions after the surface of the body is pinched to the acupuncture point, namely local inflammation around the needle prick, transmission between cells, cutaneous-some-visceral reflex, and neural transmission to muscles (Chen, 2016).

The results of the data analysis of the intervention group showed a significant value of hand muscle strength ( $p$  0.003;  $\alpha$  0.05) and leg ( $p$  0.005,  $\alpha$  0.05) where ( $p$  <0.05) it can be concluded that there is a significant difference in strength. A muscle in the intervention group before and after being given acupuncture. The findings of this study suggest that there is a significant effect of acupuncture on lower and upper muscle strength. The results of this study are supported by research conducted by Shin and Lee

which states that acupressure points in the scapular region have a very close relationship with trigger points to increase the strength of the upper limb muscles (Shin & Lee, 2007; Adam, 2014). A trigger point is a sensitive point that, when pressed, causes pain in the area where the stimulus is located. The trigger points can be found in the skeletal muscles and tendons, ligaments, joint capsule, periosteum, and skin (Shin & Lee, 2007).

The presence of nerve endings and blood vessels around the acupuncture point will respond to the area around the acupuncture. The tissue then releases its mediators to repair damaged tissue immediately and initiates rapid chain biochemical reactions. Mediators in this chain reaction are histamine, serotonin, kinins, lymphokines, leukotrienes, and prostaglandins. The effect is limited only locally. The mediator rarely causes distant reactions. The microtrauma also causes the release of the neuropeptide Calcitonin Gene-Related Peptide (CGRP), anti-inflammatory substance P, and local  $\beta$  endorphins. Large amounts of CGRP cause pro-inflammatory reactions, but on the other hand, small amounts of CGRP have anti-inflammatory effects. The release of histamine, heparin, and prothesis kinins will cause vasodilation of blood vessels which causes an increase in vascular permeability, which results in increased blood circulation to the tissues and will lead to increased circulation around the bones and muscles to quickly improve motor function in the extremities ( Zijlstra FJ, Lange IB, Huygen FJPM, Klein J, 2003; Oktaria, 2017). In addition, the basic mechanism of biological reactions after the body surface is pressed to the acupressure point consists of four biomolecular and biophysical domains, namely local inflammation around pressure, transmission between cells, cutaneous-some-visceral reflex, and neural transmission to muscles (Chen, 2016). Some of these mechanisms are believed by researchers to increase muscle strength in hemiparesis patients.

Pathophysiologically, the reduction in muscle strength after a stroke leads to a decrease in muscle mass or atrophy so that rehabilitation interventions are very important in reducing the effects of muscle atrophy, maintaining the length of muscle fibers and tendons will be very good in generating muscle strength (Gray, 2016). In this study, giving acupuncture for 14 days gave a rehabilitation effect through the basic mechanism of biological reactions in four biomolecular and biophysical domains, namely local inflammation around pressure, intercellular transmission, cutaneous-some-visceral reflex and neural transmission to muscle. also plays a role in preventing atrophic conditions, maintaining the length of muscle fibers which will later maintain and increase muscle strength in hemiparesis patients

The increase in better muscle strength may also be due to stimulation of the brain's motor neurons with the release of transmitters (Acetylcholine) to stimulate the cells to activate calcium which results in protein integrity (Hinchliff, et al. 2005). If calcium and troponin C are activated, it will activate actin and myosin in skeletal muscle so that function can be maintained and can be an increase in muscle strength. The contraction mechanism can increase the smooth muscle of the extremities. Acupuncture is thought to

induce stimulation to increase the activation of chemicals, neuromuscularly, and muscles. The smooth muscles in the actin and myosin filaments have chemical properties and interact with one another. The interaction process is activated by calcium ions and ATP and then becomes ADP to provide energy for the contraction of the limb muscles (Hinchliff et al., 2005).

### **LIMITATION**

This study has limitations regarding stroke patient and neurological repair

### **CONCLUSION**

In general, the use of acupuncture meridian points can increase muscle strength in stroke patients. Giving acupuncture meridian points can stimulate nerve endings and blood vessels around the acupuncture point to respond to the area around the acupuncture. The tissue then releases its mediators to repair damaged tissue immediately and initiates a rapid chain biochemical reaction. So that the use of acupuncture meridian points can provide the benefits of restoring muscle strength in stroke patients.

### **AUTHOR CONTRIBUTION**

**Dodik Hartono:** Collected literature, searched for questionnaires, compiled manuscripts, and conducted data analysis

**Deny Prasetyanto:** Collected data, tabulated the data and coding

**Ainul Yaqin Salam:** Collected the data and compiled manuscripts

**Erna Handayani:** Collected the data and compiled manuscripts

**Grido Handoko Sriyono:** Collected the data and compiled manuscripts

**Ishaq:** Compiled manuscripts

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### **ORCHID**

No orcid ID

### **CONFLICT OF INTEREST**

There is no conflict of interest in this research.

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