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## MERIDIAN ACUPUNCTURE IN STROKE REHABILITATION: A LITERATURE REVIEW

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### ABSTRACT

Rehabilitation therapy has an important role in restoring bodily functions comprehensively due to stroke which aims to restore function so as to reduce disability. One therapy that nurses can do is to use acupuncture meridian points. Acupuncture is considered to play a leading role in the treatment of symptoms related to stroke. This literature review aims to analyze the benefits of the acupuncture points in stroke rehabilitation. The research method used by the author is a literature review using several databases namely Pubmed, Cochrane Library, EbscoHost, Proquest and Google Scholar from 2008 to 2018. An article that discusses rehabilitation of stroke patients using acupuncture meridian points is used as a medium of rehabilitation. The literature search results show that the rehabilitation of acupuncture meridian points provides the benefits of recovery of stroke symptoms such as hemiparesis, dysphagia, dementia, and reduced volume and infarction including neurological deficits so as to improve the quality of life for stroke patients.

**Keywords:** stroke, rehabilitation, quality of life, acupuncture, meridians

### 1. Introduction

Stroke is the second most common cause of death, as well as the main cause of disability in adults worldwide (1). Data on ischemic stroke and hemorrhagic stroke increased significantly between 1990 and 2010, the percentage of incidence of ischemic stroke reached 80% and 20% hemorrhagic stroke (2). Symptoms caused by stroke, such as hemiplegia, cognitive impairment, aphasia, and dysphagia, greatly affect a patient's ability to carry out daily activities, as well as social participation in the environment and burden families and communities in many developed countries (3).

Recovery of bodily functions due to stroke symptoms requires a multidisciplinary care team and involves a variety of approaches, such as medicine, rehabilitation therapy and nursing care. Rehabilitation therapy plays an important role in the return of

comprehensive body functions due to stroke, the program aims to restore function so as to reduce disability (4). In East Asia, acupuncture has played a major role in the treatment of stroke-related disorders (5). Many doctors and patients in Western countries and developing countries have begun to receive acupuncture with a merger as an alternative therapy for various neurological diseases as rehabilitation therapy in this case is stroke (6). There are studies that explain the benefits of the meridian point of acupuncture in stroke rehabilitation both in overcoming problems physically and psychologically. This paper was made with the aim of analyzing the benefits of the acupuncture point in stroke rehabilitation.

## **2. Method**

The research method used by the author is a literature review. The author uses several databases namely Pubmed, Cochrane Library, EbscoHost and Google Scholar. The inclusion criteria including the article discussing about nursing rehabilitation programs in stroke patients; and (2) English full-text articles published between January 2008 to September 2018. The author also uses several search keywords namely "nursing rehabilitation", "stroke rehabilitation", "acupuncture", "hemiparesis", "dysphagia", and "stroke's rehabilitation". The results of the search produced 28 articles consisting of randomized controlled trial articles, controlled clinical trials, systematic literature review articles, cohort study articles, cross-sectional study articles.

## **3. Result**

### **a. Theoretical Concept**

Stroke is defined as acute focal injury of the central nervous system arising from a vascular cause such as cerebral infarction, intracerebral hemorrhage, or subarachnoid hemorrhage, there are rapidly developing clinical signs of focal or global disorders that affect brain function, can last more than 24 hours and can cause death (7). Many of the symptoms that occur in these stroke cases include hemiparesis, where about 85% of patients with stroke experience it immediately after a stroke occurs (8). Hemiparesis occurs due to blockage of the carotid or basilar arteries which causes deficits in the area supplied by the media and anterior cerebral arteries where the anterior choroid artery that is blocked can affect the internal capsule. Acute hemiparesis can develop in response to a variety of cerebral diseases including intracerebral hemorrhage and ischemic stroke (9). Besides hemiparesis, there is also dysphagia which is one of the most common strokes with an incidence of 81% (10). There are also symptoms of dementia that commonly occur after a stroke, with a 1-year incidence of poststroke that starts from 7.4% to 41.3%. Post-stroke dementia is one of the main determinants of dependence among patients with stroke conditions, and it also predicts recurrence of ischemic stroke in the long term (11). From the various problems above, it is necessary to take action in the form of rehabilitation. The rehabilitation phase includes treatment, initial physical therapy, work, and speech, all of which are intended to help the recovery and rapid adaptation of patients to the activities of daily life (12).

The quality of life of patients can be defined as individual perceptions of their position in life associated with the prevailing cultural and value system context, goals, expectations, and standards so that they are not limited to physical but psychosocial, economic, and environmental aspects (13). Rehabilitation is defined as a problem solving education process that aims to reduce the disability experienced by a person as a result of illness or injury (14). Other rehabilitation

therapies include exercise programs to improve aerobic fitness and / or muscle strength, limitation of non-paretic upper limbs, repetitive task training for paretic arms, bilateral arm training, back gait exercises and treadmills, walking aids, botulinum intramuscular administration of toxins for seizures , splints to prevent and treat contractures, electrical neuromuscular stimulation, and acupuncture (15).

#### **b. The meridian point rehabilitation program for hemiparesis among stroke patients**

Acupuncture is one of the oldest and most studied techniques in medical treatment where a procedure involves inserting fine needles into the skin or deeper tissue at the location of the body's meridians (acupoints). These needles can be manipulated manually, electrically, or with heat (16). Recent research has shown that acupuncture points may be complex to the muscles / skin-nerves that contain high-density nerve endings. Where manual acupuncture or electroacupuncture (EA) at acupuncture meridian points is active towards afferent fibers that send signals to the spinal cord (17). In a study by pressing the meridian points at six acupuncture points of the 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 (18). The basic mechanism of biological reactions after the surface of the body is punctured by acupuncture points, there are four biomolecular and biophysical domains, namely local inflammation around the needle puncture, intercellular transmission, cutaneous-somato-visual reflex and neural transmission to muscle (19).

#### **c. The meridian point rehabilitation program for dysphagia among stroke patients**

Based on the TCM theory, the pathogenesis of dysphagia after stroke is caused by a lack of liver and kidney stagnant Qi and blood that fails to nourish the tongue, and pathogenic factors, especially wind and phlegm, further obstruction of the doctor and throat, due to difficulty swallowing (20). In this case of dyspepsia the meridian points used All patients in the acupuncture group will receive acupuncture at acupuncture points such as GB12 (Wan Gu, bilateral), GB20 (Feng Chi, bilateral), CV23 (Lian Quan), DU20 (Bai Hui), and LI4 (He Gu, bilateral) and HT5 (Tong Li, bilateral), including ST40 (Fenglong, bilateral) for pathogenic subtypes and LR3 (Taichong, bilateral) for liver elemental balancing types in TCM (10). This study shows that the efficacy of acupuncture therapy combined with other interventions is better than the control group. The findings of this study are able to provide evidence of the effectiveness of acupuncture treatment to improve swallowing function and quality of life after stroke patients (21).

#### **d. The meridian point rehabilitation program for dementia among stroke patients**

Acupuncture is one of several treatments used as a rehabilitation program for stroke patients and is generally considered safe (22). The incidence of acupuncture-related side effects is relatively low, especially when treating patients with Alzheimer's disease or cerebral infarction (1, 23). To clarify the effects of acupuncture treatment in reducing dementia in patients with stroke several possible explanations are given, namely the administration of stimuli (acupuncture points: Tai

chong (Liv3) and He gu (LI4)) can cause activation in areas with decreased activity; it can also cause deactivation in areas with increased activity for patients with mild cognitive impairment and Alzheimer's disease (24). Acupuncture with the use of meridian points has been found to reduce or relieve depression, anxiety, obesity, migraines and Parkinson's disease (25,26). These factors can also contribute to reducing the incidence of dementia after stroke (27).

#### **e. The meridian point rehabilitation program for brain recovery among stroke patients**

In a study conducted by Ping Wu (28), it was explained that the use of acupuncture meridian points is very useful in the brain's functioning. as for the points used are other Baihui (GV20), Fengchi (GB20), Quchi (LI11), Hegu (LI4), Yanglingquan (GB33), Zusanli (ST36), Sanyinjiao (SP6), and Xuanzhong (GB39) points (22). This study is also in line with other studies that explain significantly using meridian acupuncture points to improve neurological function (28).

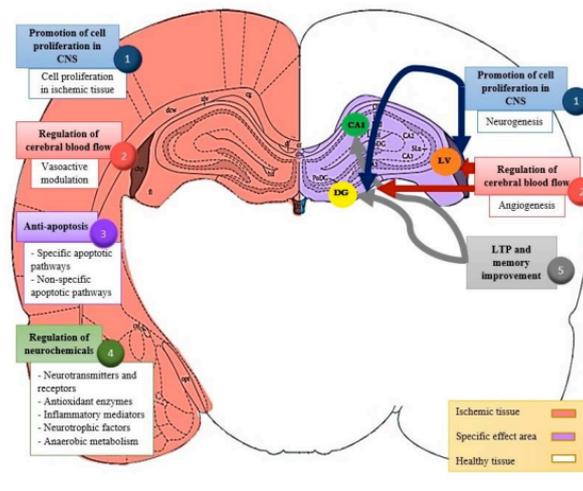
### **4. Discussion**

All benefits obtained from the use of acupuncture meridian points can not be separated from the pathophysiology process in the body. During an ischemic stroke, the cell population in the CNS is affected and two main zones develop, according to the degree and duration of ischemia; ischemic core, where cell death occurs immediately, and ischemic penumbra, where despite initial damage, the tissue structure is intact but its function is changed. Because damage is reversible, this zone is the most important target in acute stroke therapy (29, 30). Acupuncture increases CNS cell proliferation after ischemic stroke through two different mechanisms; first, with neurogenesis, which is limited to the neurogenic area (the subventricular zone of the [LV] lateral ventricle and dentate gyrus [DG] of the hippocampus) in adulthood. Second, acupuncture increases cell proliferation in ischemic-affected tissues and several other zones adjacent to injuries caused by occlusion of the middle cerebral arteries (30).

Acupuncture increases stem cell division by increasing GSK-3  $\beta$  / PP2A expression, increasing BDNF / VEGF neurotropic factors (brain-derived neurotropic factors / vascular endothelial growth factor), and increasing neuroprotective substances such as retinoic acid. GSK3  $\beta$  / PP2A is a group of proteins that are related to the biological process of phosphorylation and cell proliferation. GSK3  $\beta$  controls protein synthesis, cell proliferation, differentiation, and apoptosis; PP2A decreases GSK3  $\beta$  activity by dephosphorylation. It balances protein activity and regulation of their expression correlates with control of CNS neurons, increases neurogenesis in the hippocampus, and increases cerebral blood flow in the ischemic cortex, hippocampus, and striatum. BDNF and VEGF function as mediators for the survival of neural stem cells; they stimulate adult neurogenesis, increasing the birth of new neurons and the migration of neurons in the neurogenic area. VEGF itself is the main angiogenic factor. EA increases the number of neuroblasts in the subventricular and hippocampal zones, and BDNF and VEGF expression mediates PI3K activation in the same neurogenic area (9, 22).

The five main mechanisms involved in the beneficial effects of acupuncture / EA therapy in ischemic stroke rehabilitation are illustrated in the Scheme. These five mechanisms are supported by evidence from the literature review, as follows: (1) Promotion of neurogenesis and proliferation of cells in the central nervous system (showing neurogenesis in the subventricular zone of lateral ventricles) (LV) and dentate gyrus (DG) in the hippocampus, and cell proliferation in ischemic networks) (9, 31); (2)

Regulating cerebral blood flow in the ischemic area (showing angiogenesis in LV and DG, and vasoactive modulation in ischemic tissue)(32); (3) Anti-apoptosis in the ischemic region (through modulation of specific and non-specific apoptotic pathways) (33); (4) Neurochemical regulations, such as: (a) Neurotransmitters and receptors, (b) Antioxidant enzymes, (c) Inflammatory mediators, (d) Neurotropic factors, (e) Anaerobic metabolism; and, (5) Increased impaired LTP and memory after stroke, through increased LTP in the DG and CA1 regions of the hippocampus. The arrows in the Scheme show possible areas in the brain that are related to certain mechanisms (30).



## Mechanism of Meridian Points of Acupuncture for Stroke Rehabilitation (30)

### 5. Conclusion And Recommendation

In general, the use of acupuncture meridian points during the acute stage provides benefits for the recovery of stroke symptoms such as hemiparesis, dysphagia, dementia, and reducing volume and infarction including neurological deficits so as to improve the quality of life for stroke patients.

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