



Available online at www.sciencedirect.com

Journal of Acupuncture and Meridian Studies

journal homepage: www.jams-kpi.com



RESEARCH ARTICLE

Ginger Pharmacopuncture Improves Cognitive Impairment and Oxidative Stress Following Cerebral Ischemia

Jinatta Jittiwat^{1,3}, Jintanaporn Wattanathorn^{2,3,*}

¹ Faculty of Medicine, Mahasarakham University, Maha Sarakham, Thailand

² Department of Physiology, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand

³ Integrative Complimentary Alternative Medicine Research and Development Group, Khon Kaen University, Khon Kaen, Thailand

Available online Sep 27, 2012

Received: Jun 22, 2012
Accepted: Aug 30, 2012

KEYWORDS

acupuncture;
ginger;
oxidative stress;
pharmacopuncture;
stroke

Abstract

Recent findings have demonstrated that acupuncture and ginger can each improve memory impairment following cerebral ischemia. We hypothesized that ginger pharmacopuncture, a combination of these two treatments, could increase the beneficial effects. Due to the limitation of supporting evidence, we aimed to determine whether ginger pharmacopuncture could improve cognitive function and oxidative stress following cerebral ischemia. Male Wistar rats were induced by right middle cerebral artery occlusion (Rt. MCAO) and subjected to either acupuncture or ginger pharmacopuncture once daily over a period of 14 days after Rt. MCAO. Cognitive function was determined every 7 days, using escape latency and retention time as indices, and the oxidative stress status of the rats was determined at the end of the study. Rats subjected either to acupuncture or to ginger pharmacopuncture at GV20 demonstrated enhanced spatial memory, and the activities of catalase and glutathione peroxidase in both cerebral cortex and hippocampus were improved. Elevation of superoxide dismutase activity was observed only in the hippocampus. Cognitive enhancement was observed sooner with ginger pharmacopuncture than with acupuncture. The cognitive enhancing effect of acupuncture and

* Corresponding author. Department of Physiology, Faculty of Medicine, Khon Kaen University, 123 Mittrpararb Road, Muang District, Khon Kaen 40002, Thailand.

E-mail: jintanapornw@yahoo.com (J. Wattanathorn).

ginger pharmacopuncture is likely to be at least partially attributable to decreased oxidative stress. However, other mechanisms may also be involved, and this requires further study.

1. Introduction

Stroke is the second most common cause of cognitive impairment and dementia. The prevalence of cognitive impairment following cerebral ischemia is approximate 36.7% [1]. The most common types of cognitive deficits resulting from stroke are disturbances of attention, language syntax, delayed recall and executive dysfunction affecting the ability to analyze, interpret, plan, organize, and execute complex information [2–5]. Hence, this disorder is regarded as a very important health problem. According to Traditional Chinese Medicine, ischemic stroke is regarded as Yin pattern syndrome [6]. Therefore, the goal for treatment is to improve Yin–Yang balance.

Acupuncture has long been used for treating numerous ailments, including stroke and memory deficit. It has been established that acupuncture stimulation of Baihui (GV20) can relieve some of the consequences of stroke, such as headache, anxiety, and dizziness [7–9]. More recently, pharmacopuncture, or herbal acupuncture (an integration of acupuncture and herbal therapies), has been introduced to optimize the benefits of acupuncture and herbal medicine. This type of therapy involves injecting minute quantities of herbs, medicines, self-blood, oxygen, and allergens [10] into acupoints.

Ginger (*Zingiber officinale*), a plant in the Zingiberaceae family, is a culinary spice that has been used as an important herb in Traditional Chinese Medicine for many centuries. Ginger is regarded as a Yang herb, which can decrease Yin and nourish the body. It also possesses antioxidant [11–13], anti-motion sickness [14], and anti-inflammatory activity [15], and improves memory [16] and blood circulation [17]. Moreover, previous work in our laboratory has shown that ginger extract at a dose of 200 mg/kg BW can improve memory deficit in an animal model of ischemic stroke [18].

Since acupuncture at GV20 and ginger extract individually have many health benefits, we hypothesized that the combination of these treatments might further ameliorate brain damage and memory impairment in stroke condition. Since oxidative stress has been reported to play a crucial role in the pathophysiology of ischemic stroke, this study aimed to determine the effect of ginger pharmacopuncture on brain damage in the cerebral cortex and hippocampus and on oxidative stress markers in this area.

2. Materials and methods

2.1. Plant material and preparation of the extract

Z. officinale rhizomes were dried for 7 days in the shade at room temperature. These were then ground and the powder was stored in cloth bags at 5 °C until the aqueous extract was prepared. For this purpose, the dried plant material (25 g) was stirred in 250 mL

of distilled water for 15 min at 95 °C followed by rapid filtration, first by a crude cellulose filter and then using Whatman #1 filter paper. The average w/w yield was 9.78%.

2.2. Animals

Male Wistar rats weighing 300–350 g were obtained from the National Laboratory Animal Center (Salaya, Nakorn Pathom) and housed in groups of five per cage in standard metal cages at 22 ± 2 °C on a 12:12 hour light–dark cycle. All animals were given free access to food and water *ad libitum*. Experiments were designed to minimize animal suffering, and the experimental protocols were approved by the Institutional Animal Care and Unit Committee, Khon Kaen University, Thailand (Record No. AEKKU 07/2554).

2.3. Induction of focal cerebral ischemia

All experimental rats were fasted for 12 hours but they were allowed free access to water before surgery. Anesthesia was induced by means of intraperitoneal injection of thiopental sodium at a dose of 50 mg/kg body weight. Focal cerebral ischemia was induced as described by Longa et al [19]. Briefly, the right common carotid artery and the right external carotid artery were exposed through a ventral midline neck incision and were ligated proximally. A silicone coated nylon monofilament (4–0) suture (USS DG; Tyco Healthcare Group Lp, CT, USA), the tip of which was rounded by heating near a flame, was inserted through an arteriotomy in the common carotid artery just below the carotid bifurcation, and advanced into the internal carotid artery approximately 17–18 mm distal to the carotid bifurcation, until a mild resistance was felt. Occlusion of the origins of the anterior cerebral artery, the middle cerebral artery, and the posterior communicating artery was thereby achieved. The wound was sutured, and the rats were returned to their cages with free access to food and water. The incision sites were infiltrated with 10% Povidone–Iodine Solution for antiseptic postoperative care.

2.4. Determination of cognitive function

The water maze consisted of a metal pool (170 cm in diameter × 58 cm deep) filled with tap water (25 °C at 40 cm deep) and divided into four quadrants (NE, NW, SE, and SW) by two imaginary lines crossing the center of the pool. In the center of one quadrant was a removable escape platform. This was below the water level and was covered with a nontoxic milk powder. For each animal, the invisible platform remained at its location at the center of one quadrant throughout training. Rats were tested on their ability to remember the location of the platform in relation to various environmental cues. Each rat was gently placed in the water facing the wall of the pool from one of the four starting points (N, E, S, or W) along the perimeter of the pool, and the animal was allowed to swim until it found and climbed onto the platform. During the training sessions, the rat was gently placed on the platform by the experimenter when it could not reach the platform within 60 seconds. In either case, the rat was left on the platform for 15 seconds before removal from the pool. The time for the animals to climb on the hidden platform was recorded as escape latency. Retention memory was determined the next day. During this

Download English Version:

<https://daneshyari.com/en/article/3098963>

Download Persian Version:

<https://daneshyari.com/article/3098963>

[Daneshyari.com](https://daneshyari.com)