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Review article

Acupuncture as treatment for nervous system diseases

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ABSTRACT

Acupuncture and moxibustion have been used for at least 2000 years to treat a wide range of diseases. In recognition of the increasing worldwide interest in the subject, the World Health Organization conducted a symposium on acupuncture in 1979 and put forth a list of 40 suitable diseases that can be treated with this approach. In Taiwan, acupuncture is widely used as a tool to treat diseases and disorders of the nervous system such as stroke, dementia, Parkinson's disease, and carpal tunnel syndrome. Although numerous studies on the effectiveness of acupuncture have been conducted, the efficacy of acupuncture as treatment for nervous system diseases or disorders has been questioned mainly because only a limited number of controlled clinical trials have been published. The aim of this review is to determine whether there is enough evidence in previously published trials to support the beneficial effects of acupuncture on diseases of the nervous system.

1. Introduction

Acupuncture and moxibustion have been used to treat diseases in China for over 2000 years. The meridian theory of acupuncture was first recorded in detail in *The Yellow Emperor's Classic of Internal Medicine* [1,2], although *The Great Compendium of Acupuncture and Moxibustion*, published in the Ming Dynasty, forms the basis of modern acupuncture theory and practice [2]. In recognition of the increasing worldwide interest in the subject, the World Health Organization conducted a symposium on acupuncture in 1979 and put forth a list of 40 suitable diseases that can be treated with this approach [3]. In Taiwan, acupuncture is commonly used to treat diseases and disorders of the nervous system, namely stroke, dementia, Parkinson's disease, epilepsy, Bell's palsy, carpal tunnel syndrome, and headache. Although numerous studies on the effectiveness of acupuncture have been conducted, the efficacy of acupuncture as treatment for nervous system diseases or disorders has been questioned mainly because only a limited number of controlled clinical trials have been published. The aim of this review is to determine whether there is enough evidence in previously published trials to support the beneficial effects of acupuncture on diseases of the nervous system.

2. Acupuncture in stroke

Stroke is one of the most common diseases in Taiwan, and was the third leading cause of death in that country in 2011 [4].

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Hu et al. conducted a randomized, controlled study to evaluate the effect of acupuncture on acute stroke symptoms. A total of 30 patients with onset of symptoms within 36 hours were randomly assigned to receive acupuncture in combination with conventional supportive treatment or to receive supportive treatment only. Acupuncture was applied three times per week for 4 weeks and patients were then followed-up for 3 months. They found that neurologic outcome was significantly better in the acupuncture group on day 28 and on day 90, and that improvement in neurologic status was greatest in patients with a poor baseline neurologic score [5]. In a randomized controlled study on the effects of electro-acupuncture (EA) in patients with first-ever ischemic stroke, Hsieh et al. reported that patients who received eight courses of EA with stimulation pulses alternating between 3 Hz and 15 Hz over a 1-month period showed significantly better improvement in motor function than patients who received conventional rehabilitation treatment only [6]. Johansson et al. studied whether sensory stimulation can improve functional outcome in stroke patients. A total of 78 patients with severe hemiplegia were randomized within 10 days after stroke onset to receive either daily physiotherapy alone (40 patients) or in combination with EA (2–5 Hz) for 30 minutes twice a week for 10 weeks (38 patients). They found that patients who received EA recovered faster than controls and showed greater improvement in balance, activities of daily living (ADL), and quality of life [7]. In a multicenter controlled trial by the same group, 150 patients with moderate to severe hemiparesis were randomized 5–10 days after stroke onset to receive EA, transcutaneous electrical nerve stimulation (TENS), or subliminal electrostimulation (control group). A total of 20 treatment sessions were performed over a 10-week period and outcome variables were assessed at the 3-month and 1-year follow-ups. Interestingly, there were no significant differences among the three groups in improvement in motor function, walking ability or ADL [8], indicating that acupuncture did not produce a beneficial effect on functional outcome in stroke patients. Similar results were reported by Gosman-Hedström et al. in their randomized study on the effects of acupuncture treatment on daily life activities and quality of life in 104 patients with acute stroke [9], and by Sze et al. who found that there was no significant difference in outcome between stroke patients with moderate or severe functional impairment who received acupuncture at 10 acupoints for 10 weeks and stroke patients who received standard post-stroke motor rehabilitation training [10]. Lack of a beneficial effect of acupuncture as treatment for stroke patients has been reported in other studies as well [11,12].

A number of studies, however, have shown that acupuncture is an efficacious post-stroke therapy. For example, Naeser et al. reported that patients with right-sided hemiplegia due to left hemispheric ischemic infarction who received 20 acupuncture sessions over a period of 1 month beginning 1–3 months after stroke onset showed a significantly better response than patients who received sham acupuncture [13]. In addition, Kjendahl et al. found that acupuncture applied for 30 minutes three or four times per week for 6 weeks resulted in a positive long-term effect on motor function, daily life quality, and social interaction in patients with subacute stage (mean, 40 days) stroke 1 year after hospital discharge [14].

Recently, Liu et al. conducted a randomized, crossover pilot study on the effects of EA on motor recovery in chronic stroke survivors. A total of 10 stroke patients who had suffered a stroke more than 2 years prior to enrolment were randomized to receive either EA (1–2 Hz) plus strength training treatment twice per week for 6 weeks or a 6-week session of strength training treatment only. They found that patients who received 2 Hz EA plus strength training treatment had a marked reduction in muscle spasticity of the wrist and a marked increase in active wrist extension range of motion and Fugl-Meyer upper-limb scores. These effects were not noted in patients who only received strength training treatment. The findings indicate that EA reduces muscle spasticity and enhances performance of motor tasks [15]. Results from a similar study also revealed that EA (twice per week) combined with muscle training exercises for 6 weeks reduced the degree of muscle spasticity in chronic stroke patients [16]. In addition, a recent study showed that acupuncture treatment accompanied by manual twisting of needles at the Baihui (GV20) acupoint and at the spirit acupoints for 20 minutes in patients with first-ever ischemic stroke resulted in significantly greater reduction in displacement area than acupuncture without twisting of needles, indicating that acupuncture with twisting of needles can improve balance function [17].

Rorsman and Johansson investigated whether EA or TENS influences cognitive and emotional outcome after stroke. In their study, 54 stroke patients with moderate or severe functional impairment were randomized to receive acupuncture including EA, TENS, or subliminal TENS (control group). Acupuncture started from 5–10 days after stroke onset, and was performed for 30 minutes, two times per week for 10 weeks. They found that there were no significant differences in changes among the three groups in emotional status or cognitive function at 3 or 12 months after treatment [18]. In contrast, Chou et al. showed that 1 EA (1 Hz) applied to the PC6 and HT7 acupoints for 20 minutes, twice per week for 8 weeks, had a positive effect on cognition and life quality in stroke patients with cognitive impairment [19].

The effectiveness of acupuncture on motor function, ADL, and cognitive function in patients with acute stroke remains controversial. More rigorous randomized controlled studies comprising larger patient populations are needed to definitively determine whether acupuncture is a valuable treatment for stroke patients.

3. Acupuncture as treatment for degenerative disorders

3.1. *Alzheimer's disease and vascular dementia*

Alzheimer's disease is a chronic progressive degenerative disease. Several systematic review articles have revealed that acupuncture is not effective in patients with Alzheimer's disease [20] or vascular dementia [21,22]. However, Zhou and Jin showed that acupuncture had a beneficial effect in patients with Alzheimer's disease. The researchers used functional magnetic resonance imaging to evaluate brain changes in 26