Available online at www.sciencedirect.com

Integrative Medicine Research

journal homepage: www.imr-journal.com

Review Article

Research advances in treatment of neurological and psychological diseases by acupuncture at the Acupuncture Meridian Science Research Center

Bombi Lee[a], *Seung-Nam Kim*[a], *Hi-Joon Park*[a,b], *Hyejung Lee*[a,b,*]

[a] *Acupuncture and Meridian Science Research Center, College of Korean Medicine, Kyung Hee University, Seoul, Korea*
[b] *The Graduate School of Basic Science of Korean Medicine, College of Korean Medicine, Kyung Hee University, Seoul, Korea*

ARTICLE INFO

Article history:
Received 14 January 2014
Received in revised form
28 February 2014
Accepted 25 March 2014
Available online 1 April 2014

Keywords:
acupuncture therapy
depression
multidisciplinary research
neurological diseases
Parkinson's disease

ABSTRACT

Acupuncture is an ancient therapeutic intervention that can be traced back at least 2100 years and is emerging worldwide as one of the most widely used therapies in the field of complementary and alternative medicine. Due to limitations associated with Western medicine's focus on the treatment of diseases rather than on their causes, interests are shifting to complementary and alternative medicines. The Acupuncture and Meridian Science Research Center (AMSRC) was established in 2005 to elucidate the neurophysiological mechanisms of acupuncture for neurological diseases based on multidisciplinary research supported by the Korean Ministry of Science and Technology. In the AMSRC, resultant research articles have shown that acupuncture can improve neurological and psychological problems, including Parkinson's disease, pain, and depression, in animal models. Basic research studies suggest its effectiveness in treating various problems such as depression, drug addiction, epilepsy, ischemia, dementia, Parkinson's disease, and pain. We strongly believe that these effects, evident from the AMSRC research results, can play leading roles in the use of acupuncture for treating neurological diseases, based on collaboration among various academic fields such as neurophysiology, molecular genetics, and traditional Korean medicine.

1. Introduction

Acupuncture has been practiced in China for more than 2100 years, and is a natural healing therapy that has gained increasing popularity and acceptance by the public and health care professionals worldwide. Acupuncture had been used in Korea long before it was introduced to Japan in the 6th century AD, and spread to Europe and North America during the 16th–19th centuries AD.[1] In 1971, a report by James Reston in the New York Times about his experience of acupuncture treatment in

* *Corresponding author*. Acupuncture and Meridian Science Research Center, College of Korean Medicine, Kyung Hee University, 1, Hoegi-dong, Dongdaemun-gu, Seoul 130-701, Korea.
E-mail address: hjlee@khu.ac.kr (H. Lee).

http://dx.doi.org/10.1016/j.imr.2014.03.003

China exposed countless Americans to acupuncture for the first time. Since then, research on acupuncture has been conducted extensively worldwide.

Acupuncture is claimed to be an effective treatment against diseases, with wide applications. It has advantages of low cost and minimal side effects. Acupuncture has been used for hwabyung or depression, as well as for treating chronic illnesses and injuries such as back pain, knee osteoarthritis, tension headache, migraine, nausea, and vomiting.[2,3] There is a current trend to expand the therapeutic scope of acupuncture to cosmetic treatment, diet, and plastic surgery.

However, basic research on the efficacy of acupuncture and its mechanisms of action is insufficient to systematize and objectify acupuncture therapy due to a lack of experimental approaches. Therefore, the efficacy of acupuncture is being investigated intensively in huge research programs to identify its various uses in Western countries.

Acupuncture needling can affect multiple systems in the body including the nervous system, immune system, and cardiovascular system, so more than one research method is necessary. The necessity for multidisciplinary research also arises due to the merits of both Western and Oriental medicines.

The Acupuncture and Meridian Science Research Center (AMSRC) at Kyung Hee University, Seoul, Korea, was opened in 2005, with support from the Korean Ministry of Science and Technology with the aim of conducting multidisciplinary research. The primary goal of the AMSRC is to establish a scientific basis for understanding the functional mechanisms of acupuncture and to investigate the therapeutic effectiveness of acupuncture for neurological diseases. According to the article "Global trends and performances of acupuncture research," Kyung Hee University has been ranked, by the articles listed in Science Citation Index-Expanded, as a leader in the field of complementary and alternative medicine[4] for the past 20 years, with contributions from the AMSRC. These research outcomes are a result of intensive efforts by Kyung Hee University to develop Korean medicine by identifying the value of traditional Korean medicine. The AMSRC brings scientific expertise and ancient traditional knowledge together in a comprehensive, translational, and integrated approach to identify the value of traditional Korean medicine.

Despite the dramatic development of Western medicine along with considerable advances in modern medicine, neurological diseases increase considerably with aging. Neurological diseases are defined as hereditary and sporadic conditions characterized by progressive nervous system dysfunction. Neurological diseases such as dementia and Parkinson's disease (PD) are burdensome from individual and social perspectives due to their poor prognosis. Thus, it is possible that acupuncture, with its rapid and broad therapeutic effects when applied clinically, is the appropriate therapeutic method for treating neurological diseases. A number of AMSRC researchers are studying the efficacy and mechanism of acupuncture for neurological diseases. These researches are intended to both examine the efficacy of acupuncture for neurological diseases and establish improved clinical research models for acupuncture therapy through multidisciplinary research.

In this review article, we summarize the findings of 4 years of research at the AMSRC aimed at exploring the effectiveness of acupuncture for neurological and other diseases and expanding the understanding of its functional mechanisms and therapeutic effectiveness.

1.1. *Effects of acupuncture on depression and anxiety disorders*

To develop an animal model that perfectly reproduces the symptoms of depression in patients, researchers at the AMSRC choose maternal separation (MS), exposure to chronic stress, and depression with chronic inflammation response in the rats or mice. First, Kim et al[5] and Park et al[6] conducted animal model experiments using MS as representative of an event that might cause a depressive disorder. Early stressors such as MS or social isolation can influence the development of biological and neurological systems and increase vulnerability to neurodegenerative diseases and psychiatric conditions such as depression and anxiety. Long-term consequences of stress due to MS usually appear as neurodegenerative changes in the brain and depressive-like behavior in a stress-dependent manner.[7] A proteomic approach was used to express and identify new hypothalamic proteins in MS rats in an animal model to study early environmental insults.[5] In a group with MS given acupuncture at acupoint Sobu (HT8), five proteins were downregulated and nine were upregulated, compared with the untreated MS group. Among the nine proteins upregulated by acupuncture treatment, Kim et al[5] and Park et al[6] found four to be related to neurodevelopment. Therefore, acupuncture at HT8 may affect neurodevelopment and be a possible therapy for neurodevelopmental disorders. Additionally, acupuncture at acupoint Shenmen (HT7) significantly increased the frequency of entry and the amount of time spent in the open arms in the elevated plus maze test, reduced plasma corticosterone (CORT) levels, and reduced arginine vasopressin expression in the hypothalamus of MS rats, suggesting that it may reduce anxiety-related behaviors and modulate activation of the hypothalamic–pituitary–adrenal (HPA) axis.[6] In further studies, acupuncture at HT7 improved MS-induced depressive-like behaviors in the tail suspension test, normalized the 5-hydeoxyindole-3-acetic acid (5-HIAA)/serotonin (5-HT) ratio, alleviated serotonin transporter (5-HTT), and increased brain-derived neurotrophic factor (BDNF) reduction in the prefrontal cortex (Fig. 1).[8] Although it remains elusive whether reduction of 5-HTT expression or restoration of the 5-HIAA/5-HT ratio by acupuncture stimulation is more crucial for improving these behaviors, it is obvious that acupuncture at HT7 alleviated MS-induced impairment of the 5-HT system in that study. The authors of these studies also suggested that the MS-induced changes in the 3,4-dihydroxyphenylacetic acid/dopamine (DA) ratio in the hippocampus and prefrontal cortex, and plasma CORT levels in MS rats were significantly alleviated after HT7 stimulation (Fig. 1).[9] Based on the results of these and previous studies, the authors suggested that functional recovery of the prefrontal–limbic system by acupuncture stimulation plays an important role in the treatment of depression-like symptoms in MS rats.

Second, chronic stress results in dysregulation of the HPA axis in the neuroendocrine system, as evidenced by