

# Digital Acupuncture Promote Post-Stroke Motor Rehabilitation among Aging Population: A Prospective Clinical and Neuroimaging Study

Tianzhu Chen<sup>1</sup>, Chen Chen<sup>1</sup>, Tianyan Chen<sup>2</sup>, Yong Zhang<sup>1</sup>, Yihuai Zou<sup>1\*</sup>

<sup>1</sup> Dongzhimen Hospital, Beijing University of Chinese Medicine, Beijing 100700, China

<sup>2</sup> School of Journalism and Communication, Renmin University of China, Beijing 100872, China

\*Corresponding author

## ABSTRACT

Acupuncture may be a promising adjunct to western medicine for aging stroke rehabilitation clinically, but the visualized and explanatory evidence is limited in post-stroke neuroplasticity. To explore the target effects and digital evidence on neuroplasticity of acupuncture for post-stroke motor rehabilitation among aging population. Ischaemic stroke patients (n = 29) whose lesions located on right subcortical ganglia and duration within 6 weeks were asked to receive the acupuncture-intervened neuroimaging assessments, with acupuncture at GB34 and non-acupoint of GB34 (NA\_GB34) on 2-week interval. Healthy controls (n = 26) were matched to receive once GB34-intervened neuroimaging assessment. Per-protocol analysis of clinical and neuroimaging was performed to investigate the digital effects of acupuncture. Specifically, voxel-mirrored homotopic connectivity (VMHC) combined with grey relational analysis was to identify the pathological characteristics and specificity of GB34. Regional homogeneity (ReHo) with path analysis was to establish a regulatory interhemispheric pathway of acupuncture at GB34. 29 ischaemic stroke patients (mean [SD] age, 60.66 [9.80] years) and 26 age-matched as well as gender-matched healthy controls (mean [SD] age, 55.88 [7.89] years) were included in the study. In the resting state, the patients demonstrated significantly decreased VMHC on cuneus (CUN) as well as superior frontal gyrus medial (SFGmed) and increased ReHo on left precentral gyrus (PreCG) compared to healthy controls (GRF, voxel level  $P < 0.001$ , cluster  $P < 0.05$ ), with closely grey relations to National Institute of Health Stroke Scale (NIHSS) scores ( $r = 0.957$ ), Fugl-Meyer assessment of lower extremity (FM-LE) scores ( $r = 0.648$ ) and upper extremity (FM-UE) scores ( $r = 0.598$ ). In the acupuncture state, it presented decreased VMHC of CUN without SFGmed and ReHo of right Cuneus and bilateral SFGmed when acupuncture at GB34 (GRF, voxel level  $P < 0.001$ , cluster  $P < 0.05$ ). Path analysis model revealed the VMHC of SFGmed was positively effected by the ReHo of right SFGmed (standardised path coefficient: 0.474,  $P = 0.001$ ) as well as right CUN (standardised path coefficient: 0.459,  $P = 0.002$ ), and the VMHC of CUN (standardised



path coefficient: 0.508,  $P = 0.002$ ) at GB34 state. There were no acupuncture-related adverse events among participants during the acupuncture state. Acupuncture at GB34 could regulate the abnormal homotopic connectivity of the motor dysfunction associated regions, with an ipsilateral pathway from intrahemispheric regional homogeneity to interhemispheric homotopic connectivity. GB34 may be a core effect acupoint for the motor recovery of ischaemic stroke patients, and acupuncture could be a prospective complementary therapy to the aging post-stroke rehabilitation at the early subacute stage. By the medicine-engineering methodological designs, we should search more co-designed methodology and multimodal evidence on neuroimaging, artificial intelligence and other digital indicators to support the acupuncture effects and optimize the clinical regimens on post-stroke rehabilitation for aging population.

The study was registered on Chinese Clinical Trial Register (Registration number: ChiCTR1900022220; Date of Registration: 2019-03-30), and was approved by the Ethics Committee of Dongzhimen Hospital Affiliated to Beijing University of Chinese Medicine (DZMEC-KY-2018-58). Participants gave informed consent to participate in the study before taking part.

**Keywords:** Acupuncture; Rehabilitation; Neuroplasticity

### How to Cite

Tianzhu Chen, Chen Chen, Tianyan Chen, Yong Zhang, and Yihuai Zou; “Digital Acupuncture Promote Post-Stroke Motor Rehabilitation among Aging Population: A Prospective Clinical and Neuroimaging Study”, *AJIR Abstracts*, pp. 7-8, 2024.

