

Reviews

Comments on Selection of Non-acupoints beyond Meridians in Studies of Acupuncture and Moxibustion

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With the development of clinical research on acupuncture and moxibustion, clinical therapeutic effects must be scientifically evaluated. In clinical randomized trials, controlled methods are significant and non-acupoints beyond meridians are commonly used for sham acupuncture. Research on comparisons of acupoints along meridians and non-acupoints beyond meridians has become an important subject, and some observations showed no difference between the two. The specificity of acupoints plays an important role in clinical and theoretical acupuncture research. If this core component is held in any doubt, the basis of acupuncture and moxibustion will be destabilized. Furthermore, the reasonable selection of non-acupoints beyond meridians determines the efficiency of controlled trials, and the reality and accuracy of experimental results. In an attempt to make progress towards standardizing clinical studies on acupuncture and moxibustion, this paper reviews common methods for selecting non-acupoints beyond meridians used in the past decade.

Domestic Methods Used in Selecting Non-Acupoints beyond Meridians

1. Non-acupoints selected beside acupoints

Using morphological and anatomical criteria, Yu An-sheng et al. compared Hegu (LI 4), Shenmen (HT 7), Sanjinjiao (SP 6), and Zusanli (ST 36) with non-acupoints.¹⁻⁴ They positioned 1 × 1 cm pieces of paper with the acupoints at the centers, and identified non-acupoints with pieces of paper of the same size located 1.5 cm away. They found some differences, but not others, in the nerves, vessels, lymph, and tendons showing that acupoints are dimensional configurations composed of multiple tissues. Magnetic resonance imaging (MRI), magnetic encephalography, electroencephalogram, and colorized transcranial Doppler (TCD) have been used to investigate the specificity of

acupoints, and researchers have found some differences between acupoints and non-acupoints. HU Ka-ming, et al. compared the effect of acupoints and non-acupoints on cerebral function in 18 normal subjects.⁵ They found that the activation types of Guangming (GB 37), Taichong (LR 3), Fenglong (ST 40), and Xianggu (ST 43) were similar to those of non-acupoints located: 1 *cun* lateral to Guangming (GB 37), 0.5 *cun* lateral to Taichong (LR 3), 2.5 *cun* lateral to Fenglong (ST 40), and 1.5 *cun* lateral to Xianggu (ST 43). Gu Xing observed the influence of electroacupuncture (EA) at Hegu (LI 4) and a non-acupoint located 3 cm lateral to Hegu (LI 4), and found different magnetic encephalography signals at the acupoint and non-acupoint in 6 healthy volunteers.⁶ ZHANG Wei-ting, et al. used 64-channel electroencephalography to analyze the modulatory functions of transcutaneous electric nerve stimulation (TENS) on analgesia-related electrical activities of the brain in 15 normal subjects.⁷ Electrical stimulation of Zusanli (ST 36) and Sanyinjiao (SP 6) had modulatory functions on pain-related signaling in certain brain areas which were not found in the two non-acupoints located 4 cm lateral to Zusanli (ST 36) and 3 cm lateral to Sanyinjiao (SP 6). HUANG Cong-yang found differences between acupoints and non-acupoints beyond meridians by using TCD to compare the influence of needling the points in the Bladder Meridian, non-acupoints along the meridian, and non-acupoints beyond the meridian located 2 cm lateral to the acupoints used on blood flow of the basilar-

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vertebral artery.⁸ CHEN observed gastrointestinal motility in 41 women after trans-abdominal hysterectomy using pressure on Zusanli (ST 36), Sanyinjiao (SP 6), and Neiguan (PC 6), and non-acupoints located 3–4 *cun* lateral to the acupoints on the tibial or radial side. It was found that pressing acupoints effectively improved the disease, but there was no significant difference between the acupoint and non-acupoint group.

The above-mentioned results showed that non-acupoints were mostly selected 2–4 cm lateral to the acupoints used, and no different anatomical structures were found. However, these studies did not identify any existing specificities of acupoints or problems with the methods used for locating the non-acupoints. Specificity of acupoints includes not only anatomical diversity, but also biological, physical, chemical, and clinical differences. Indeed, the effects of acupoints and non-acupoints varied; therefore, the material basis for the specificity of acupoints should be investigated using the combined approaches of molecular biology and neurobiology. Clinically, selecting non-acupoints beside acupoints is understandable and easy to handle.

2. Non-acupoints selected in the middle of two meridians

YANG Jian, et al. observed 40 cases of patients with coronary heart disease and divided them randomly into 4 groups: Neiguan (PC 6) group, Shenmen (HT 7) group, Neiguan (PC 6) and Shenmen (HT 7) group, and non-acupoint group in which the bilateral points in the middle of Neiguan (PC 6) and Lieque (LU 7), and the middle of Shenmen (HT 7) and Taiyuan (LU 9) were used.¹⁰ The effects of needling the points in the four groups on the isoelectric periods (S-T segments) of electrocardiograms were compared. Results showed that needling acupoints but not non-acupoints was able to obviously normalize the S-T segments. DENG Hai-ping, et al. used an infrared spectrometer on 104 volunteers and found that irradiation at Taiyuan (LU 9) and Daling (PC 7) significantly improved pulmonary function when compared with the effect of irradiation at a non-acupoint located in the middle of the connecting line of Taiyuan (LU 9) and Daling (PC 7).¹¹

Selecting non-acupoints by locating them in the middle of two acupoints is similar to locating them beside acupoints. The non-acupoint locations are definitely beyond meridians, but locating them is not as convenient as beside meridians.

3. Non-acupoints selected in remote areas

AI Lin, et al. established a pain model in 17 healthy subjects, applied acupuncture at Taichong (LR 3), and selected the point 3 cm lateral to Zusanli (ST 36) as a non-acupoint.¹² There were no significant differences in the reduced activated volumes in the anterior cingulate and thalamus. HU Xiang-long found traces induced by infrared radiation had different physical characteristics when Chize (LU 5), Mingmen (GV 4), and the loci 9 cm lateral to them were heated.¹³

Selection of non-acupoints in remote areas described by distances to certain acupoints is easy to handle in practice.

Methods in Selecting Non-Acupoints beyond Meridians Used Overseas

1. Non-acupoints selected beside acupoints

Zaslowski randomly applied the following 5 measures in 13 volunteers: rotating needle at Hegu (LI 4), deep insertion into Hegu (LI 4) without rotation, rotating needle at a non-acupoint located in the middle of Luozhen (EX 26) and Yaotong, deep insertion into the non-acupoint, and sham irradiation at Hegu (LI 4).¹⁴ It was found no significant differences in pressure-induced pain sensations between the rotating needle at Hegu (LI 4) and at the non-acupoint. ZHU found an obviously different therapeutic effect when it was divided 29 cases of chronic cervical pain into an acupuncture group in which EA was applied at Shousanli (LI 10), Waiguan (TE 5), Quchi (LI 11), and Sanyangluo (TE 8), and a sham acupuncture group in which EA was applied at loci 2 or 3 cm lateral to the acupoints.¹⁵ Kong, et al. applied EA and tapping by finger as a control at Kunlun (BL 60), Guangming (GB 37), and a non-acupoint located 1.5 cm posterior to the capitulum fibulae.¹⁶ It was found the effects of EA and tapping by finger were different, but they did not find any different EA-induced effects between acupoints and non-acupoints as indicated by functional magnetic resonance imaging (fMRI). Lee observed the electrical conduction along meridians in 20 normal subjects, and found that the electrical conduction rate between Hegu (LI 4) and Quchi (LI 11) was significantly higher than that between Hegu (LI 4) and a non-acupoint located 1 cm lateral to Quchi (LI 11).¹⁷ When treating 66 cases of mild or moderate intractable bronchial asthma, Medici divided the patients into a needling acupoint group, a needling non-acupoint group,

and a control group without needling.¹⁸ Ten acupoints including Dingchuan (EX 17), Feishu (BL 13), Yuji (LU 10), Taixi (KI 3), Hegu (LI 4), and Quchi (LI 11) were selected, and non-acupoints were located beside them. There was a significant difference in therapeutic effect between the needling acupoint group and the control group, and between the needling non-acupoint group and the control group in the 4th and 5th months of treatment, respectively. There was no significantly different therapeutic effect between the two acupuncture groups; however, the difference was only found in the eosinophil count in the 5th and 10th month of treatments.

Overseas researchers located non-acupoints 1–3 cm lateral to the meridians with methods similar to those used in China. The results they obtained varied, and no positive correlation with the distance to acupoints was found.

2. Non-acupoints selected in remote areas

Maioli compared the potentials evoked by magnetic stimulation in 14 normal subjects at Hegu (LI 4) and Tiaokou (ST 38) as an acupoint group, with those at the locus 2 cm to the wrist joint on the left side of Yuji (LU 10) in the upper limb, the locus between the vastus lateralis muscle and the biceps muscle of the thigh, and the locus in the middle of the popliteal transverse striation and the apex of the greater trochanter of the lateral part of the thigh as the non-acupoint group; It was obtained a similar effect in the two groups.¹⁹ Assefi divided 100 cases of fibromyalgia into an acupoint group in which 14 acupoints including Quchi (LI 11), Yinlingquan (SP 9), Tianshu (ST 25), and Yintang (EX 1) were selected, and 3 sham acupuncture groups in which the following 6 loci were selected: 1) 2 *cun* below the umbilicus and 1 *cun* lateral to the midline in the lower abdomen; 2) 2 *cun* to the medial femoral condyle at the inferior margin of the femoral muscle; 3) 1 *cun* posterior to the tibia end on the medial side of the leg; 4) 4 *cun* to the elbow transverse striation in the ulnar wrist flexor belly; 5) the symphyses of the deltoid and biceps muscle at the anterior medial border of the arm; 6) and the middle of the rectus femoris muscle, the anterior superior iliac spine, and the superior exocornu of the patella in the central region of the thigh.²⁰ The results showed that the therapeutic effect in the acupoint group was not superior to that in the sham acupuncture groups. Melchart divided 270 cases of tension headache, at random, into an acupuncture group, a micro-acupuncture at non-acupoint

group, and a group for being ranked. Fengchi (GB 20), Jianjin (GB 21), Taichong (LR 3), Hegu (LI 4), Shangxing (GB 23), and Yintang (EX 1) were used in the acupuncture group, while the middle of Binao (LI 14) and acromion, 2 *cun* lateral to Tianfu (LU 3), the middle of Tongli (HT 5) and Yinxi (HT 6), 1 *cun* lateral to the ulnar side, 1 *cun* below the lower border of the shoulder, 2 *cun* below the spinal column at the apogee of the costal arch, 5 *cun* lateral to the 4th and 5th lumbar vertebrae, 4 *cun* above the knee, 6 *cun* above the knee in between the Spleen and Stomach Meridians, and 2 *cun* lateral to Fengshi (GB 31) in between the Spleen and Stomach Meridians apart from the Gall Bladder Meridian, were used as non-acupoints.²¹ It was found that all the effects in the acupuncture group and non-acupoint group were better than those in the being ranked group, but there were no differences found in the acupuncture and non-acupoint groups. Kim studied the analgesic effect of needling Zusanli (ST 36) and the deltoid muscle on the bilateral side as a non-acupoint, during hysterectomy.²² It was found that the effect in the acupuncture group was significantly better than in the control group. Brinkhaus randomly divided 52 cases of allergic rhinitis into a treatment group treated by acupuncture plus Chinese herbs, and a control group treated by needling non-acupoints plus non-specific Chinese herbs.²³ Hegu (LI 4), Yinxiang (LI 20), Fengchi (GB 20), Lieque (LU 7), and Taichong (LR 3) were used in the acupuncture group, and the following 5 loci were used in the control group: 1) the middle of the internal epicondyle of the humerus and the wrist part of the ulna on the ulnar side; 2) the medial and lateral side of the calcaneus; 3) the middle of the medial margin of the patella and the medial side of the calcaneus at the upper part of the internal angle of the tibia; 4) four fingers' distance above the medial side of the calcaneus; 5) and the middle of the medial elbow and the fossa axillaris near the achilles tendon. The therapeutic effects showed by visual analogue scales (VAS) and life quality were obviously better in patients in the treatment group than in the control group.

The non-acupoints beyond meridians described in this section were remote from the acupoints and meridians used. Since multiple acupoints were widely distributed, a considerable number of non-acupoints were chosen at varying distances to the acupoints used. The locations were described according to anatomy as this was convenient for the clinic. Less difference was found in

the effects of needling acupoints and non-acupoints.

Analysis and Comments

1. Comparison of domestic methods in selecting non-acupoints beyond meridians with those used overseas

The studies described above show that there are some similarities and differences in the way non-acupoints are selected in China and overseas. Mostly, locations 0.5–4 cm lateral to the acupoints used were chosen as non-acupoints in China, but those 1–3 cm laterals to acupoints and some remote loci were selected overseas. The distances to the acupoints were described in cm and to a lesser extent with *cun* for non-acupoints in China, while anatomical terms with illustrations were used overseas. In China, multiple measures such as evoked potentials, EEG, and MRI were applied when investigating acupoint specificities. Overseas research on non-acupoints was mostly designed as a placebo, and was evaluated by clinical effects; cerebral function imaging (fMRI) was used both in China and overseas. When comparing the needling effect between acupoints and non-acupoints, positive results were found more often in China, but negative results overseas. Non-acupoints selected were widely distributed in the head, thorax, abdomen, and the four limbs; the limbs were used the most and the head was used the least, possibly due to the dense distribution of acupoints in the head making it difficult to locate non-acupoints in this region. In some overseas research, less extensional descriptions for locating non-acupoints exist, with cursory descriptions that do not identify the side lateral to the acupoints, and only describe the locations as being near acupoints or in a specific anatomical region.

2. Problems existing in selecting non-acupoints beyond meridians and looking forward to the future

Because there are no unified standards for locating non-acupoints beyond meridians, and there are some acupoints besides those in the 14 meridians used in China, it is difficult to design methods to locate non-acupoints. Clinically, there are problems when selecting non-acupoints which may result in discordant results. There is no consensus about the theory of acupuncture and moxibustion, about meridians and acupoints, and about being out of the musculature of meridians and collaterals. In some overseas research, there is a lack of extensional and detailed descriptions

with illustrations. Furthermore, it is hard to compare whether the lateral or remote way is better. Therefore, it is necessary to evaluate the effect of various methods for selecting non-acupoints so as to provide effective techniques and unified standard descriptions for clinical investigations.

It is a challenge to establish unified standards for selecting non-acupoints. The authors propose that the following aspects should be taken into consideration: 1) A corporation of international anatomists and acupuncturists must determine the location of non-acupoints and ensure they are not the acupoints used in China and overseas, and that they are out of the running course of meridians, distribution of musculature of meridians, collaterals, and neural segments. 2) The locations of non-acupoints beyond meridians should be screened by clinical investigations of the therapeutic effect and needling sensation. 3) The most probable locations of non-acupoints should be identified using a computer which can analyze and superimpose meridians, musculature of meridians, collaterals, and neural segments. These locations should be described with standard terms and illustrations. 4) Standards for locating non-acupoints and handling should be established. The development of theories of acupuncture and moxibustion can only occur if the clinical effects of acupuncture and moxibustion are evaluated, the theories of acupuncture and the specificities of acupoints are elucidated, and international cooperation and communication is promoted.

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