To accomplish preliminary Qigong simulation state by acupuncture

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Objective: The purpose of the study was to find out how to enter the preliminary Qigong simulation state in a short period of time.

Methods: This is a non-randomized, human experiment with healthy participants. A multi-channel digital physiological data recorder was used to detect whether the participants had entered the Qigong state. Participants were assisted to enter the Qigong state (relaxation, tranquility and naturalness) by being given the sore (sour) feeling produced by acupuncturing Hegu (LI4), and suggestions (repeating words “relax” and “heat” from the hypogastrum).

Results: About 72.2% of the participants who had no Qigong experience were found entering the preliminary Qigong simulation state. Most of the physiological parameters measured after the participants entering the Qigong state showed significant changes compared with the baseline data.

Conclusion: This study revealed that acupuncture-made sore feeling is able to induce the participants to quickly enter the preliminary Qigong simulation state; hence this can be seen as no longer a limited phenomenon, but can be commonly applied to everybody.

Keywords: Qigong; point LI4 (Hegu); acupuncture

Qigong has been shown to benefit its practitioners, and prevent and control diseases¹,² and it currently exists in thousands forms³. As outlined by Lim et al⁴ about practicing, Qigong, in brief, is rhythmic respiration with slow inhaling and exhaling of air by controlling the mind, diaphragm, nasal passage,
tongue, mouth and lung in certain body postures so that qi flows in a certain direction as controlled by the mind. However, the reason that a majority of academic circles in the world has not accepted Qigong is primarily due to the lack of effective research methods.

Research studying the effects of external qi had to recruit the so-called Qigong masters as their participants, but the results were not consistently stable, if not outright contradictory to each other. In addition to that, practicing Qigong is very time-consuming, which makes repeating the results on other participants in other laboratories very difficult, though we believe that Qigong should be a universal physiological phenomenon of human body. This study, based on our understanding of Qigong generation mechanisms, successfully developed a new speedy, stable, and highly repeatable method, allowing almost anyone to achieve the preliminary Qigong simulation state (relaxation, tranquility and naturalness) through sore (sour) feeling of acupuncture. The study participants were first asked to close their eyes and rest, then acupuncture and suggestions were provided. This approach brought them to the preliminary Qigong simulation state quickly.

1 Materials and methods

1.1 Study participants The study was performed on 64 healthy volunteers, consisting of 30 males and 34 females, at 18 to 24 of age. Among them, 28 had previous Qigong experiences (Neiyang Gong) while the remaining 36 had not practiced Qigong ever. The study participants had experience undergoing acupuncture prior to the previous 6 months. They were randomly selected to participate in this study. Neiyang Gong is a breathing method to breathe with lower abdominal movement. The eyes are closed while one’s concentration is placed on the hypogastrum, followed by counting silently from 1 to 10 with each breath, and repeating the whole process again. During the test day, the participants were not allowed to have any alcoholic or caffeinated beverages, and were food-restricted for at least 1 h before the experiment. They took one-hour rest routinely before each test. The participants were seated in a quiet, draught-free laboratory with controlled temperature (24 ± 1°C) and humidity, in the morning at 9:00; tests were conducted at about the same time of day. Each participant was asked to sit down and close his/her eyes for recording physiological parameters.

The participants were explained what they might encounter in this study. They might feel a prick of the needle, a Deqi sensation when they were pricked, and a feeling of numbness possibly accompanied with warmth, and spread from the site of puncture[5]. The point Hegu (LI4) was located by referring to an anatomical landmark, that is, the highest point of the adductor pollicis muscle when the thumb is adducted. The Hegu point, which has been reported to produce a strong analgesic effect to the oral region, could be induced to give strong Deqi sensation by acupuncture stimulation[6]. A disposable stainless needle (0.2 mm × 30 mm, Seirin Co. Ltd, Shizuoka, Japan) was inserted into the muscle, to a depth of about 15 mm, and the “twisting needling” technique was applied. The standardized manipulation technique (twisting needling) used involved needle rotation between the fingers, through a large (540° to 720°) angle in a bidirectional manner, first clockwise and then anticlockwise. This manipulation lasted for approximately 3 to 8 s. It was stopped with the needle retained in muscle for 30 min when a participant felt the Deqi sensation (feeling numb, sore, and hot sensations in his hands)[5]. Four minutes after the sore sensation appeared, the participant used his/her lower abdomen to breathe with his/her eyes closed, and concentrated on his/her hypogastrum. He/she was suggested to relax and observe for heat production in his/her hypogastrum until he/she felt that his/her whole body achieves the Qigong state. In such a state, the participants should feel heat coming from the hypogastrum with propagated sensation along meridians (PSM), or tingling heat (tingling heat feeling circulating all over the body)[7]. Acupuncture plus some kind of suggestions could lead the
participants to quickly enter the preliminary Qigong simulation state (relaxation, tranquility and naturalness). Physiological parameters of the participants in the Qigong state were measured; the data (experimental data) were compared with the measurements before they entered the state (control data). Physiological data of those without entering the Qigong state were not taken into account. This study was approved by the Ethics Committee of the Chia Nan University of Pharmacy and Science, and the participants were subject to informed consent.

1.2 Physiological measurements Physiological measurements were carried out using chart 3.3.5 PowerLab (AD Instruments Inc. Milford, MA, USA) on a computer linked to a multi-channel digital data recorder (PowerLab/8S ML780, AD Instruments Inc. Milford, MA, USA). The following parameters were measured: electroencephalogram (EEG), finger pulse amplitude (FPA) and electrocardiograph (ECG) integrated with a cardiometer to obtain a mean heart rate (HR; beats per minute), skin conductance level (SCL) and electromyogram (EMG) from the dorsum of the right hand, and skin temperature from the dorsum of the right hand. Skin temperature was measured with a type-T thermocouple thermometer (BAT-10, Physiomet Inc., NJ, USA) that could detect differences in temperature with a resolution and accuracy of 0.05°C. In each experiment, probes were placed on the dorsum of each participant’s right hand. The FPA measurement used a piezo-electric element to convert force applied to the active surface of the transducer into an electrical signal. The transducer (The Maclab Transducer 1010) was connected directly to the British naval connector (BNC) input of the PowerLab (AD Instruments Inc., Milford, MA, USA). In order to produce a signal, a change in force should be applied to the active surface of the transducer, which could detect the expansion and contraction of the second finger circumference resulted from the changes in blood pressure. The SCL was measured by two Med Associate 10-mm Ag/AgCl cup electrodes connected to the fingertips of the first and third fingers of the right hand. The 10-mm diameter of the electrode represented electrode paste (ECI Electro-Gel) contact. An electrode placed on the left leg process was used as an earth reference. The EMG was measured from the dorsum of the right hand, using two miniatures Gereonics Ag/AgCl electrodes placed on the right palm and dorsum of the right palm. The EMG was collected for each scoring period of baseline. The EEG in the right frontal lobe of the cerebrum site signal was amplified using Grass P511 amplifiers (Grass Instrument, Quincy, MA, USA; half-amplitude set at 0.3 Hz and 10 Hz), and digitized (usually at 100 Hz). The raw EEG signal displayed on one EEG channel was processed by the PowerLab software to output EEG signal power spectra. The outputs of the EMG, SCL and ECG were 12-bit A/D converted and recorded with a 4/86 computing systems technology (CST) computer at a sampling rate of 50 Hz.

1.3 Statistical analysis All the data were analyzed by Student’s t-test or Chi-Square test. The average values of the physiological data measured two min before entering the Qigong state were taken as the control (baseline) data whereas the average values of the physiological data measured two min after entering the Qigong state were the experimental data. Data were presented as the mean ± standard deviation. The participants’ experimental and control (baseline) average values were statistically compared.

2 Results

The participants entered the said Qigong state as shown by certain EEG pattern and rise of body temperature, which often accompany with people in the Qigong state[9,10]: significant changes in SCL, EMG and FPA were also observed[11]. Participants who entered the Qigong state elicited similar emotional responses. Therefore, changes in physiological parameters, including the EMG, SCL, and FPA, were measurable.

2.1 Effects of acupuncture for participants entering Qigong state Within only (8.2 ± 6.4) min after the acupuncture treatment, the participants entered the Qigong state, and the average time for the participants without acupuncture to enter the same state was (25.4 ± 10.7) min. The former group of participants took a much shorter period of time to enter the Qigong state (Table 1).

| Table 1 Effects of acupuncture for participants entering the Qigong state (Mean ± standard deviation, min) |
| --- | --- | --- |
| Group | n  | With acupuncture | Without acupuncture |
| Qigong experience (Neiyang Gong) | 28  | 8.2 ± 6.4 | 25.4 ± 10.7 |
| No Qigong experience | 36  | 15.6 ± 10.8 | 29.5 ± 12.8 |

2.2 The physiological parameters for Qigong state

The participants with no previous Qigong experience were acupunctured to induce their bodies to enter Qigong state. Once they were in the Qigong state, as shown in Table 2 and Figure 1, the temperature of their right hands rose significantly, and at the same time, their a brain wave in right frontal lobe of cerebrum site was concentrated. The measurements of participants’ power spectra showed a significant increase in mean relative power of a brain wave during the Qigong state as compared with the control (baseline) stage (Figure 2). Therefore, these participants were confirmed to stay in the Qigong state. Their skin temperature
increased slowly when they began to receive acupuncture, but increased quickly when they entered the Qigong state. The phenomenon was observed for every participant. The slow increase of skin temperature seemed to be a must for entering the Qigong state.

### Table 2 The physiological parameters for control (baseline) and Qigong state

<table>
<thead>
<tr>
<th>Physiological parameter</th>
<th>Baseline</th>
<th>Qigong state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electroencephalogram</td>
<td>(16.8±5.9) μV</td>
<td>(38.5±13.5) μV</td>
</tr>
<tr>
<td>Skin temperature</td>
<td>(33.31±0.13) °C</td>
<td>(33.79±0.24) °C</td>
</tr>
<tr>
<td>Electromyogram</td>
<td>9.4±4.3</td>
<td>116.5±35.6</td>
</tr>
<tr>
<td>Skin conductance level</td>
<td>(13.2±4.9) μS</td>
<td>(30.2±11.7) μS</td>
</tr>
<tr>
<td>Finger pulse amplitude</td>
<td>(32.5±7.8) pulses/min</td>
<td>(65.5±14.3) pulses/min</td>
</tr>
<tr>
<td>Heart rate</td>
<td>(72.9±8.6) beats/min</td>
<td>(70.8±11.9) beats/min</td>
</tr>
</tbody>
</table>

Electroencephalogram data are calculated from the mean relative power of α wave. Electromyogram data are presented with integral from baseline per minute. Heart rate is presented in beats per minute. Skin conductance level is calculated from the baseline score. Finger pulse amplitude is calculated from the pulse number per minute that amplitude is over 500 beats/min. The data are presented as mean±standard deviation (n = 30 to 56). Student’s t-test was used for the comparison between baseline and Qigong state. * P < 0.05, vs baseline data.

![Figure 1](image1.png)

**Figure 1 Effects of Qigong state on the change of dorsum of skin temperature at the right palm**

After the participants entered the Qigong state (indicated by arrow), the skin temperature of their palms increased. A representative curve of 36 experiments is shown.

![Figure 2](image2.png)

**Figure 2 Changes of mean relative power of α wave during Qigong state at the right frontal lobe of cerebrum site**

(A) Typical spectra of control (baseline) stage and Qigong state. (B) The raw electroencephalogram signals were displayed (the Qigong state being achieved). A representative curve of 42 experiments is shown.

![Figure 3](image3.png)

**Figure 3 The pattern of the electromyogram at the dorsum of the right hand for each stage during control (before Qigong state) and the Qigong state (indicated by arrow)**

A representative curve of 30 separate experiments is shown.

In these physiological parameter tests, the EMG baseline of the hand was very initially stable, but once the participants entered the Qigong state, a large fluctuation appeared from the baseline. This phenomenon was very obvious and accompanied with feeling of tingling heat (Figure 3). The changes of FPA were seen in the participants in Qigong state. Pulse appeared very frequently with amplitude increased (Figure 4). An obvious change was seen in SCL. Once the participants entered the Qigong state, their SCL increased (Figure 5). With regards to HR, this result showed that when the participant just entered the Qigong state, no distinctive differences (Figure 6) were observed within 3 min.

### 3 Discussion

Qigong is a general term that covers nearly a thousand different forms of traditional Chinese energy exercises and therapies. Some common elements could be concluded from different types of Qigong, three adjustments or regulations at the beginning (regulating body position, breathing and mind state), and three essential points during preliminary Qigong simulation state: relaxation, tranquility and naturalness. However, as far as we were aware of, there were no short cut, and effective methods reported elsewhere for people having
Figure 4  Effects of the Qigong state on the change of finger pulse amplitude

When the participants entered the Qigong state (indicated by arrow), the finger pulse amplitude and frequency were increased. A representative curve of 49 experiments is shown.

Figure 5  The change of the skin conductance level pattern for each stage during control (before Qigong state) and Qigong state (indicated by arrow)

A representative curve of 52 experiments is shown.

Figure 6  Effects of the Qigong state on the heart rate

Arrow indicated the participants entered the Qigong state. A representative curve of 56 experiments is shown.

no Qigong experience to enter the Qigong state. This study, for the first time, showed that by taking advantage of the sore feeling by acupuncture plus some kind of suggestions, the participants were allowed to quickly enter the preliminary Qigong simulation state (relaxation, tranquility and naturalness)\(^{17, 19}\). With acupuncture, but no suggestions, only 16.6% (data not shown) of the same participants automatically entered the state. When suggestions were given subsequently, as many as 72.2% of them entered the state; only 13.8% of individuals who received suggestions without acupuncture entered the state. Thus, it can be seen that providing both suggestions and acupuncture significantly increased the proportion of people who enter the preliminary Qigong simulation state. However, providing only one of these services generated only a small proportion of people entering the Qigong state.

It has not been mentioned in literature that acupuncture could help enter the state of Qigong. Many physiologists believed that the acupoints, located abundantly in muscle spindles, have a higher concentration of neurons\(^{10}\). The afferent fibers of acupoints take part in forming and maintaining the needling sensations of soreness\(^{20}\). The primary afferent C fiber (including the substance P-containing nerve) may play important roles in the input of the information of pain and needling as well as in the acupuncture\(^{21}\). It has been suggested that acupuncture on acupoints could excite some C fibers, and most of the neurons in the thalamic nucleus submedius respond to stimulation of the acupoints with afferent C fiber excitation\(^{22}\). Hsieh et al.\(^{23}\) performed a positron emission tomography study, using regional cerebral blood flow as the index of brain activity, to address the specificity of brain activation pattern by acupuncture stimulation of acupoints. Regions activated by acupuncture stimulation at Hegu included the hypothalamus with an extension to midbrain, the insula, the anterior cingulate cortex, and the cerebellum. It was only the stimulation at Hegu that could activate the hypothalamus under the similar psychophysical ratings of acupuncture sensation\(^{24}\).

The data suggested that the hypothalamus might characterize the central expression of acupuncture stimulation at Hegu, and serve as a key element in mediating efficacy of acupuncture stimulation\(^{25}\).

Qigong has been shown to increase blood flow of the brain\(^{26}\). The needle and pain sensations, caused by acupuncture, have been proved by means of a neutron instrument, to be able to accelerate blood flow to the thalamus in the interbrain, and duly activate the thalamus\(^{27}\). Activation of the thalamus sore sensation region, caused by the action of acupuncture, may well disperse and activate the temperature regulating blood control region. That explains why 4 min after acupuncture, the temperature of a participant’s hands rose by 0.6 °C and those of his face and forehead became 0.8 °C higher (data not shown). And the person himself could also sense the heat or higher temperature of his hands, face and other parts of his body\(^{28}\). He could sometimes even control the location of his heat sensations, or follow the suggestions or implications from some bystanders\(^{29-30}\). For example, when a bystander implied that he should have hot hands, and the temperature of his hands started rising, then the bystander might imply that he should have hot lower abdomen instead. His belly immediately
became warmer. Almost all of the participants in this study were found to respond to this kind of suggestions during the Qigong meditation state. The acceleration of blood flow in the skin could be actually detected by a blood flow meter.1,26

In classical medicine, Qigong allows us to take control of how and when to enter this powerful and natural state. This study however found out that shifting from common meditation to the state of Qigong is a change of mood requiring no special preparations. People can quickly go to this state by simply staying relaxed and receiving acupuncture. This study showed that the sore feeling caused by acupuncture helped a person without previous Qigong experience enter the Qigong state in 30 min during the very first test, and achieve a high level of normalization. Normally this requires several months or even years of practice for beginners to achieve. This study has so far developed an effective method to enter the Qigong state. However, whether the Qigong state induced by acupuncture is the same as, or better, or worse than that achieved through traditional Qigong practice, in terms of its effects on health maintenance, remains to be clarified in the future.

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5 Conflict of interest statement

The authors declare that there are no conflicts of interests and no agency is involved for financial support for this research work.

REFERENCES


针刺刺激可达到前气功状态

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目的：研究在短时间内使普通人进入前气功状态的方法。

方法：健康的试验参与者以随机方式参加本次试验。使用多通道生理记录仪检测试验参与者是否有进入前气功状态。参与者在针刺合谷穴的时候获得酸（得气）的感觉，同时暗示参与者穴有热及放松的感觉。由此让参与者进入一个松、静、自然的前气功状态。

结果：本研究中，72.2%没有习练气功经历的参与者成功进入前气功状态。参与者进入气功状态后，大部分生理指标与基线指标相比有显著差异。

结论：使用针刺引起的感觉可以将试验参与者快速进入前气功状态。因此气功的研究不再限制在特定的人才可以实行，本研究方法可以应用到每个人身上。

关键词：气功；穴，合谷；针刺