The Change Of Cerebral Blood Flow Before And After Treatment Of Koryo Hand Therapy
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Citation

Abstract

INTRODUCTION
The definition of health is very important for medical doctors, scientists and persons who have several kinds of diseases. We used the term defined by WHO. In oriental world it is defined as harmonized state of six solid and six hollow organs. It can be diagnosed by several diagnostic methods including pulse palpation [1]. The pulse palpation method has been applied without scientific evidence for more than 2000 years.

The methods of pulse palpation are not standardized among oriental medical community. Koryo Hand Therapy (KHT) is one new field based on oriental medicine, which was founded and developed by Yoo in 1971 and has been applied worldwide. He found one corresponding point on the hand and designated that point as M-5 in 1971 and made micromeridian system on the hand in 1975. It consists of 345 points in the hand [2,3,4].

By KHT, health is defined as well harmonized state of cerebral blood flow that can be evaluated by comparison carotid (In Yong: stomach 9)- radial (Chon Ku: lung 9) pulse diagnosis. The cerebral blood flow consists of anterior and posterior circulation. The health state can be diagnosed by comparison of anterior and posterior circulation that means carotid and vertebral system right and left, respectively [5,6,7,8,9].

A complete explanation of the acupuncture mechanism is not available at present. The clues to the basic mechanism and mystery surrounding the 3000-year-old acupuncture treatment may be revealed through modern scientific tools that more accurate and reliable treatment can be performed on patients [10,11,12].

Yoo, the founder of KHT, has emphasized the role of brain circulation in acupuncture since 1975 [6-9,10].

There are some information of cerebral blood flow using single photon emission computed tomography (SPECT), functional magnetic resonance imaging (fMRI) and positron emission tomography (PET), which have the advantages of showing the regional blood volume [13,14]. With these methods, we can’t assess the thickness of blood vessel, the character of blood flow and direct flow amount at any particular blood vessels in order to evaluate the effect of external stimuli including acupuncture.

In 1982, Aaslid and colleagues introduced a transcranial Doppler (TCD) device with a pulse sound emission of 2MHz that could penetrate the skull successfully and accurately measure both the direction and velocity of blood flow in the basal cerebral vessels and in the circle of Willis. TCD is now an accepted tool for measuring physiological parameters of blood flow in the major intracranial arteries and for evaluating several intracranial vascular pathological processes. TCD allows non-invasive assessment of blood flow velocities throughout the body.

Various procedures for the performance of TCD examination have been described. However, there is wide agreement [15,16,17] on the core principles underlying TCD examination techniques.

According to KHT, when Yin-Yang balance (which is another term similar to carotid-radial balance) among Jang Bu organs (six solid and six visceral organs) is lost, the organs become either deficient or excessive, and thus cannot function harmoniously. This unbalanced condition affects and alters the blood flow balance of the brain. In other words, when Yin and Yang are balanced, not only the function of Jang Bu organs, but also the cerebral blood flow is in harmony, which indicates the body is healthy. It is an
unique thought that the balance in the cerebral blood flow indicates perfect health. This thought does not exist in modern western medicine or oriental medicine except the principle of KHT [8,9].

The concept of the cerebral blood flow in KHT was first mentioned in the “Yellow Emperor’s Classic of Internal Medicine”, but has not been utilized in clinical experience for a long time because of its vague and poor explanation. However, Yoo originally discovered the Yin Yang pulse diagnostic method that is used to discern the abnormality of the Jang Bu organs by comparing the widths and the sizes of the radial and carotid pulse. However, other pulse diagnostic methods used among the established community of oriental medicine have generated controversy. Yoo suggests that the balanced condition of the Jang Bu organs affects the balance of the cerebral blood flow. Therefore, we can assess which Jang Bu organ has the most imbalance by detecting the change of thickness or widths and the quality of the pulse between carotid and vertebral arteries. But it is very difficult to detect the vertebral arteries as they pass through the cervical vertebra. Because of this difficulty, we measure the radial artery. It is derived from brachiocephalic artery. The connection from the radial artery to the vertebral arteries are used for detecting blood flow to the back of the brain.

Therefore we can now assess the blood flow balance to the front and rear of the brain by comparing the left carotid artery with the left radial artery, and by comparing the right carotid artery with the right radial pulse [6-8].

There are some studies on the effects of cerebral blood flow using acupuncture in humans and animal studies [23,24,25,26,27,28,29,30,31,32,33]. The results show that acupuncture effects on cerebral blood flow as mentioned in KHT, but there is no explanation of the mechanism in detail.

As the Yin Yang pulse diagnosis in KHT compares the carotid pulse with the radial pulse, right and left respectively, this Yin Yang pulse diagnosis in KHT is incomparable with any other thesis presented so far.

The cerebral circulation consists of two systems; one connects the anterior circulation and the posterior circulation, another connects the left and the right side. There are few studies showing how this circulation correlates with the normal condition of the body and pathological conditions.

Normal data for the width and intensity of the cerebral blood flow of living people has not been standardized, but recently it has become possible to examine the substantial changes that arise in various circumstances through the application of a TCD stimulator. Therefore, we think research concerning the cerebral blood flow generated in various diseases of the brain would offer new information of hemodynamic. However, it is not easy to reveal how the change of the cerebral blood flow correlates with various diseases of the nervous system [12].

Furthermore, it is difficult to detect the change of thickness or widths and the quality of the pulse between carotid and radial pulse in order to estimate the abnormality of the Jang Bu organs, which is an original parameter of Yin-Yang Pulse Diagnosis.

We tried to prove the hypothesis of the cerebral blood flow in KHT by measuring the change in the velocity of the blood using TCD indirectly. We diagnosed the constitution of volunteers based on the biorhythmic theory [30,31] and then applied KHT acupuncture needle (small magnets 2 mm in diameter and press-pellets developed by KHT (22)) to compare the change in the velocity of the carotid, vertebral and radial artery before and after stimulation using TCD (Nicolet Medical Inc., Madison, WI, USA).

The comparative Yin and Yang pulse diagnosis has been used as standard for diagnosis and treatment in KHT. Therefore, we try to ascertain how Yin Yang Pulse Diagnosis, which is used as parameter of health, is related in the change of the carotid, vertebral and radial artery. In addition we performed a corresponding experiment to find which point actually corresponds to any area of human body.

SUBJECTS AND METHODS

The examinees were selected from 12 healthy persons and 33 persons with neurological diseases. For the corresponding study, we applied Digital Infrared Thermographic Image (Dorex Inc, USA). KHT-pellet was attached at A-28, which corresponds to nose, KHT- acupuncture needle at A-22 corresponding neck and ice bag was prepared at A-8 corresponding umbilicus (Figs. 1, 2.). TCD signals were recorded in the right and left carotid, vertebral and radial arteries with TCD. The Doppler signal was optimized for each artery by adjusting the insonation angle.

The studies were performed in a quiet TCD laboratory with the subjects’ eyes kept closed (Fig 3).

The vertebral artery was assessed at depths of 60 mm with pulse wave and the carotid and radial arteries with
continuous wave adjusting the insonation angle. Doppler systems allow online calculation of mean blood flow velocity (Vm) derived from averaging the peak systolic and peak diastolic components of the Doppler waveform envelope.

Before treatment we examined the basic data of blood flow velocity. Then we reexamined the velocity of blood flow after applying KHT acupuncture needle, the magnets and press-pellets on the examinees’ hands using the eight extraordinary points such as L4, H2, M31, I38, J2, C8, K9, and F4 or I2 and E8 to compare the velocities of blood vessels from the radial artery (TaeYeon) corresponding to Lung 9 (Lu9), the common carotid artery (InYong Budol) corresponding to Stomach 9(St9) or Large Intestine (LI 19) and vertebral artery corresponding to the point (Sanchuju) between Bladder 9(B9)-10(B10) using TCD (Fig.3.). We used two points among eight extraordinary points or I-2 and E-8 according to person’s constitution (Fig. 4., Table 1).

**Figure 1**
Fig. 1: Corresponding experiment performed with KHT pellet on A-28 and KHT acupuncture needle on A-22. Note the changes on nose and neck after 2, 5, 7 and 10 minutes.

**Figure 2**
Fig. 2: Corresponding experiment performed with dry ice on A-8. Note the changes of temperature in the umbilicus area.

**Figure 3**
Fig. 3: Location of radial, carotid and vertebral artery.
Figure 4
Fig. 4: 14 micromeridians and 345 points of Koryo Hand Acupuncture.
Table 1: Scheme to treat persons according to constitution in the right and left, respectively.

<table>
<thead>
<tr>
<th>Three Constitutions</th>
<th>Jing (Yin) Organ</th>
<th>Bu (Yang) Organ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tonification</td>
<td>Sedation</td>
</tr>
<tr>
<td>Yang Excess</td>
<td>f-4</td>
<td>H-2</td>
</tr>
<tr>
<td>Yin Excess</td>
<td>c-8</td>
<td>L-4</td>
</tr>
<tr>
<td>Kidney Excess</td>
<td>K-9 (G-2)</td>
<td>I-38 (M-31)</td>
</tr>
<tr>
<td></td>
<td>F-4 (C-8)</td>
<td>H-2 (L-4)</td>
</tr>
</tbody>
</table>

Figs. 5-1 to 7 show the comparison of velocities of radial, carotid and vertebral pulse right and left in one case.

We confirmed that the overall changes in the blood velocities were not due to local narrowing by measuring the radial artery, carotid artery and vertebral artery in several different depths.

Figure 6
Fig. 5-1-a: The velocity of right radial is 14 cm/sec before treatment.

Figure 7
Fig. 5-1 b: The velocity of right radial artery is 26 cm/sec after attaching gold pellet at right I-2 on the hand and silver pellet at right E-8 on the hand. The velocity is increased after treatment.

Figure 8
Fig. 5-2 a: The velocity of right carotid is 34 cm/sec before treatment.
Figure 9
Fig. 5-2 b: The velocity of right carotid artery is 29 cm/sec after attaching gold pellet at right I-2 on the hand and silver pellet at right E-8 on the hand. The velocity is decreased after treatment.

Figure 10
Fig. 5-3 a: The velocity of right vertebral artery is 27 cm/sec before treatment.

Figure 11
Fig. 5-3 b: The velocity of right vertebral artery is 44 cm/sec after attaching gold pellet at right I-2 on the hand and silver pellet at right E-8 on the hand. The velocity is increased after treatment.

Figure 12
Fig. 5-4 a: The velocity of left radial artery is 11 cm/sec before treatment.
**Figure 13**

Fig. 5-4 b: The velocity of left radial artery is 25 cm/sec. The velocity is increased after treatment from 11 cm/sec to 25 cm/sec.

The pellet was attached along C (silver pellet on C5 and gold pellet on C9 in Lung Micromeridian) and D (gold pellet on D2 and silver pellet on D7 in Large Intestine Micromeridian) on the left hand.

**Figure 14**

Fig. 5-5 a: The velocity of left carotid artery is 35 cm/sec before treatment.

Fig. 5-5 b: The velocity of left carotid artery is 28 cm/sec. The velocity is decreased after treatment from 35 cm/sec to 28 cm/sec. The pellet was attached along C (silver pellet on C5 and gold pellet on C9 in Lung Micromeridian) and D (gold pellet on D2 and silver pellet on D7 in Large Intestine Meridian) on the left hand.

**Figure 15**

Fig. 5-6 a: The velocity of left vertebral artery is 31 cm/sec before treatment.
The Change Of Cerebral Blood Flow Before And After Treatment Of Koryo Hand Therapy

Figure 17
Fig. 5-6 b: The velocity of left vertebral artery is 40 cm/sec. The velocity is increased after treatment from 34 cm/sec to 40 cm/sec.

The pellet was attached along C (silver pellet on C5 and gold pellet on C9 in Lung Micromeridian) and D (gold pellet on D2 and silver pellet on D7 in Large Intestine Meridian) on the left hand.

STATISTICAL ANALYSIS
The data were tested with analysis of variance (Paired t-Test) applying SPSS (for windows, version 10). The results were expressed as means ± standard deviation. The criteria for significance was p < 0.05.

Fig. 6-1, 6-2, 6-3 and 6-4: Velocity Changes of carotid, vertebral and radial artery before and after treatment.

Figure 18

RESULTS
We confirmed the KHT points correspond with specific areas of the body. It is most important to make accurate diagnosis and administer the stimulation. The specific type of treatment was applied according on the volunteer’s constitution, which can be determined by the person’s birthday (biorhythmic theory).

The blood velocities of the radial, vertebral, and carotid arteries were checked using TCD in normal volunteers and persons with neurological symptoms. In both groups blood velocities of the three arteries changed after attachment of small magnets on their hands using one of Yoo’s KHT methods (any combination of two points among L4, H2, M31, I38, J2, C8, K9, and F4, or I2 and E8).

In 12 healthy volunteers and 33 persons with neurological symptoms, the blood velocity of the vertebral artery increased from 28.7 ± 8.4 cm/sec to 35.8 ± 9.1 cm/sec accompanied by the increased blood velocity of the radial artery on the same side, which indicates a positive relationship (positive feedback). A decreased blood velocity of the carotid artery from 28.0 ± 6.8 cm/sec to 21.9 ± 6.0 cm/sec was accompanied by an increase of blood velocity of the radial artery from 11.5 cm/sec to 17.2 cm/sec, showing a negative relationship (negative feedback). The change is statistically significant.

In persons with far advanced Parkinson disease, the blood velocity of the radial and the vertebral artery was lower than in healthy volunteers.

DISCUSSION
Koryo Hand Acupuncture is one of KHT that was founded and developed by Yoo in 1971. It is used worldwide these days. It is based on oriental medicine but includes unique hypothesis. It is easy to learn, easy to practice, very
The Change Of Cerebral Blood Flow Before And After Treatment Of Koryo Hand Therapy

effective, very economic and has no side effect. The 345 acupuncture points on the hand are used instead of hundreds of acupuncture points on the human body. Yoo emphasized that the key to understanding acupuncture’s secrets lies in the brain based on anterior and posterior circulation.

Although the complete explanation of the acupuncture mechanism may not be available at present, in the last twenty years there has been great development and concern in acupuncture research. Many acupuncture research scientists believe that the main thrust of acupuncture may be in the brain. Some experimental observation of the cortical projections of several acupuncture stimuli strongly support the notion that the acupuncture mechanism may be mediated through the central nervous system [11,13,14]. Many people have strong support for its efficacy and have established some theoretical bases for acupuncture such as the beta-endorphin theory of acupuncture analgesia as well as many anatomical correlation studies of meridians [11,13,14].

Litscher et al. showed that acupuncture with needles and laser could increase cerebral blood flow velocity [24-31]. They used new constructions for simultaneous and continuous monitoring of cerebral blood flow velocity within different arteries. There are further studies on the effects of cerebral blood flow using acupuncture in humans and rats [32,33].

Yoo hypothesized well balanced cerebral blood flow is parameter of health and emphasized the importance of cerebral blood circulation and the function of brain. This study was done to confirm corresponding points in the hands and to visualize the change of blood flow indirectly using TCD, which showed the relationship of carotid, vertebral and radial blood before and after KHT. Originally health can be evaluated by measuring the thickness and quality of anterior (carotid) and posterior (vertebral) artery in KHT. We need to compare carotid and vertebral artery but it is difficult to measure the thickness and quality of blood flow directly.

The present study demonstrates that carotid –radial pulsation in KHT is well correlated with the physiological information provided.

It is the first study based on new hypothesis of KHT. This study shows the effect of KHT (acupuncture and pellet and magnets which is used in KHT) in the brain.

Sophisticated tools to measure the amount of blood flow, the quality of flow and the thickness of the blood vessel as Yin-Yang Pulse Diagnosis of KHT requires, are necessary. We are convinced that TCD can be used to objectify the effects of KHT easily. The study could encourage the applications of KHT and could have wide implications for the quality of life of patients.

CONCLUSION

According to KHT theory, the cerebral blood flow becomes unbalanced when the harmonious function of Jang Bu organs in an individual is disrupted. Based on this theory, Dr. Tae Woo Yoo, the originator of KHT, defines health as the harmonized state of cerebral blood flow, that is, a well-balanced state of the anterior and posterior circulation in the brain. This theory has not been documented in Western and Oriental medicine until Yoo had proposed this theory in 1975. If properly used, KHT can change cerebral blood flow to attain a more balanced state in an unhealthy individual.

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