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Original Article

The Clinical Effect of Manipulation of Acupuncture to *Shen-Men* and *Nei-Kuan* on Autonomic Nervous Function of Healthy Subjects.

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Objectives : With an assumption of the traditional oriental medical theory, we were to evaluate the effect of tonification/sedation-manipulated acupuncture on autonomic nervous activity in healthy subjects.

Methods : This study is a randomized cross-over trial. We enrolled healthy subjects, and assigned them randomly into group A or group B. Group A received acupuncture therapy on *Shen-Men* (He-7) and *Nei-Kuan* (EH-6) with tonification-manipulation, while Group B received it with sedation-manipulation. Their heart rate variability was monitored for 2 hours. After 3 days of washout period, the subjects were crossed over to the other manipulation method, and the same procedures were performed.

Results : There was no statistical significance in the change of RR, SDNN, LF, HF, and LF/HF ratio between the tonification-manipulated and the sedation-manipulated groups. However, HF curve in the tonification manipulated group showed increasing tendency for 15 minutes after acupuncture.

Conclusions : We suggest that the traditional tonification-manipulated acupuncture on *Shen-Men* and *Nei-Kuan* could increase parasympathetic activity shortly after acupuncture, but further evaluation on a larger sample size is needed to confirm this suggestion.

Key Words : *Nei-Kuan*, *Shen-Men*, autonomic nervous function, tonification-manipulation, sedation-manipulation, heart rate variability

Introduction

From the traditional view of Oriental Medicine, acupuncture on the same acupoints can bring about different results according to the manipulation. In general, tonification-manipulation is thought to enhance vital energy, while sedation-manipulation to modulate excess energy. With an assumption of this traditional oriental medical theory, we already reported that sedation-manipulated and tonification-manipulated acupuncture showed different effects on human blood pressure[1]. We suggested those results might be explained by that manipulated acupuncture can affect autonomic nervous activity differently according to sedation or tonification. Therefore, we were to evaluate the effect of tonification/sedation-manipulated acupuncture

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on *Shen-Men* and *Nei-Kuan* on autonomic nervous activity by monitoring heart rate variability (HRV).

Methods

1. Subjects

This study was a randomized cross-over trial. We enrolled healthy male subjects at the Department of Cardiovascular & Neurologic Diseases (Stroke Center), Hospital of Oriental Medicine, Kyung Hee Medical Center, Seoul, Korea, from April 1, 2007 to October 31, 2007.

2. Procedures

The subjects were randomly assigned to Group A or Group B. Group A received the acupuncture therapy with tonification-manipulation, while Group B received it with sedation-manipulation. The time when the interventions were applied was 10:00 in the morning. Heart rate variability was monitored for 2 hours. After 3 days of washout period, Group A was crossed over to sedation-manipulation, and Group B to tonification-manipulation. Other procedures were the same as previously described.

3. Intervention

When we did the tonification-manipulation, we inserted Dong Bang sterile acupuncture needles (0.25 × 40 mm) on *Shen-Men* (He-7) and *Nei-Kuan* (EH-6) acupoints in both the subjects' hands along the meridian flow and rotated them nine times in a clockwise direction. The needles were removed after 30 minutes. When we did sedation-manipulation, we inserted the needles against the meridian flow and rotated them six times in an anticlockwise direction. Again, the needles were removed after 30 minutes (Fig. 1).

4. Measures

We assessed the subjects' heart rate variability by FM-150 (ambulatory ECG recorder. Fukuda Denshi, Japan) for 2 hours. The patch of electrode was applied to the chest (Fig. 2). The time domain analysis was based on RR intervals (ms) and SDNN (standard deviation of NN interval). Higher SDNN indicates healthier while lower SDNN shows the possibility of heart disease. The frequency domain analysis was based on LF (low frequency), HF (high frequency), and LF/HF ratio. LF can be obtained from frequency analysis ranged from 0.04 to 0.15 Hz

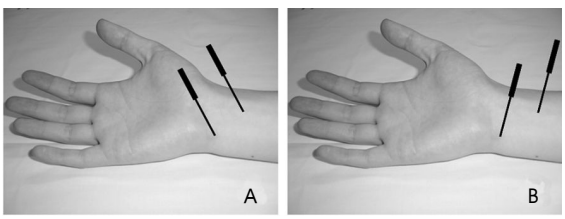

Fig. 1. Tonification/Sedation manipulated acupuncture on *Shen-Men* (He-7) and *Nei-Kuan* (EH-6). A (Sedation-manipulation): We inserted the needles against the meridian flow and rotate them six times in an anticlockwise direction. B (Tonification-manipulation): We inserted the needles (0.25×40 mm) along the meridian flow and rotate them nine times in a clockwise direction.

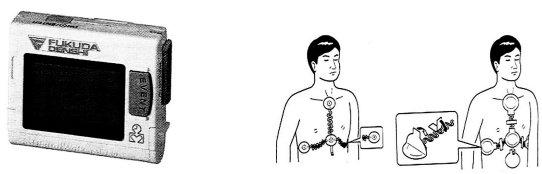

Fig. 2. FM-150 (Ambulatory ECG recorder, Fukuda Denshi, Japan) and the right figures show its application to the chest.

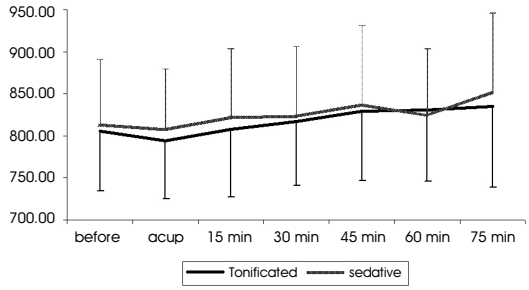

Fig. 3. Change of the RR intervals in the tonificative group (blue) and in the sedative group (red).

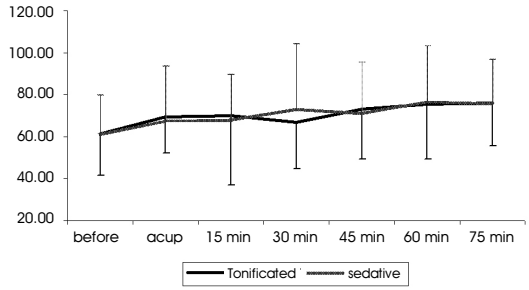

Fig. 4. Change of the SDNN in the tonificative group (blue) and in the sedative group (red).

and HF ranged from 0.15 to 0.5 Hz. LF and HF represent the activity of sympathetic nervous system and parasympathetic nervous system, respectively.

5. Statistics

Repeated measurement ANOVA was used to detect significant difference in the change of heart rate variability with the subjects between the two groups. Statistical software was SPSS for Windows, version 12.0 (SPSS Inc., Chicago, Illinois, USA), and p-value under 0.05 was considered as significant.

Results

Thirty healthy subjects were enrolled. Of them, 15 were assigned to Group A, 15 to Group B. All of them were male, and their mean age was 28.1 ± 2.1 in Group A and 28.3 ± 1.4 in Group B.

In the results, we could not find any significant difference in the change of heart rate variability including RR, SDNN, LF, HF, or LF/HF ratio (Fig. 3 to 7). However, although no statistical difference was detected, HF showed more increasing tendency for 15 minutes after acupu- ncture in the tonification group than in the sedation group (Fig. 6).

Discussion

Blood pressure is mainly modulated by the autonomic nervous system. Previous reports

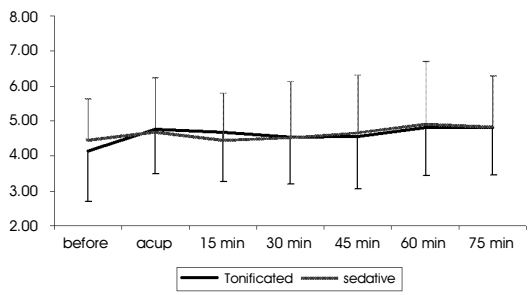

Fig. 5. Change of the LF (low frequency) in the tonificative group (blue) and in the sedative group (red).

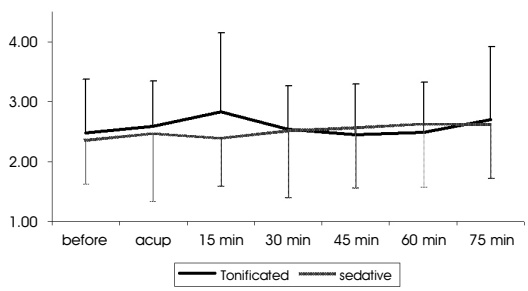

Fig. 6. Change of the HF (high frequency) in the tonificative group (blue) and in the sedative group (red).

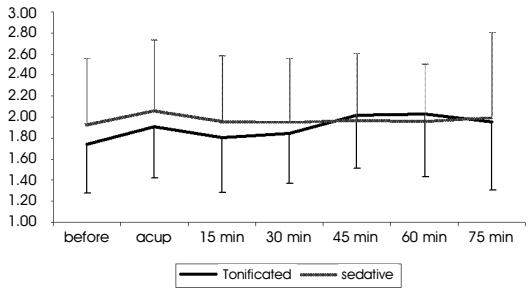

Fig. 7. Change of the LF/HF (low frequency/high frequency ratio) in the tonificative group (blue) and in the sedative group (red).

suggest acupuncture can influence the autonomic nervous system[2-7]. Especially, *Shen-Men* (He-7) and *Nei-Kuan* (EH-6) acupoints are known to increase parasympathetic nervous activity[8-10]. *Nei-Kuan* (EH-6) belongs to hand yin in equilibrium envelope of heart meridian (EH), and it reduces cardiac frequency and systolic blood pressure[8,11,14] and improves left ventricular function in patients with coronary artery disease[13]. It also reduces the sympathetic reaction to mental stress[14]. *Shen-Men* (He-7) belongs to hand yin minimum heart meridian (He), and increases the activity of vagal nerves, while decreasing the level of sympathetic activity[9]. Acupuncture on *Shen-Men* and *Nei-Kuan* seems to send specific afferent nerve signals to the central nervous system resulting afterwards in lower activity in the central sympathetic nervous system[7,15].

In our previous work[1], we reported that the sedative manipulated acupuncture on *Shen-Men* and *Nei-Kuan* reduced human blood pressure continuously more than the tonificative acupuncture on the same acupoints. Therefore, we continued our study based on the following question: "Why did sedative manipulated acupuncture show those results? What's the underlying mechanism?" We believed those results might be caused by sedation manipulation reducing sympathetic activity, thus increasing the inhibitory effects of *Shen-Men* and *Nei-Kuan* on the sympathetic nervous system[8-10]. In this study, we tested our hypothesis by monitoring heart rate variability (HRV).

In the results, there was no statistical significance in the change of RR, SDNN, LF, HF, or LF/HF ratio. However, of interest, the curve of HF showed more upward tendency for 15 minutes after acupuncture in the tonification-manipulated acupuncture group than in the sedation-manipulated. These might represent that tonificative acupuncture on *Shen-Men* and *Nei-Kuan* increases parasympathetic activity. Similar results were observed in our previous report, which showed *Shen-Men* and *Nei-Kuan* improved insomnia in stroke patients, possibly by reducing sympathetic activity[16].

In conclusion, we suggest that the traditional tonification-manipulated acupuncture on *Shen-Men* and *Nei-Kuan* could increase parasympathetic activity, but further evaluation on a larger sample size is needed to confirm this suggestion.

Acknowledgements

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