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EFFECTS OF QIGONG ON BLOOD PRESSURE, HIGH-DENSITY LIPOPROTEIN CHOLESTEROL AND OTHER LIPID LEVELS IN ESSENTIAL HYPERTENSION PATIENTS

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This study investigated the effectiveness of Qigong on blood pressure and several blood lipids, such as high-density lipoprotein (HDL) cholesterol, Apolipoprotein A1 (APO-A1), total cholesterol (TC), and triglycerides (TG) in hypertensive patients. Thirty-six patients were randomly divided into either the Qigong group, or a wait-listed control group. Blood pressures decreased significantly after eight weeks of Qigong. The levels of TC, HDL, and APO-A1 were changed significantly in the Qigong group post-treatment compared with before treatment. In summary. Qigong acts as an antihypertensive and may reduce blood pressure by the modulation of lipid metabolism.

Keywords blood pressure, HDL, hypertension, lipid metabolism, Qigong

Approximately 30% of people in Korea with hypertension, or roughly 25 million Koreans, are considered to have essential hypertension. Hypertension is a major risk factor in the development of many diseases such as thickening of the heart muscle, coronary artery defect, stroke, and dementia caused by stroke. The standard medical treatment for essential hypertension consists primarily of the use of antihypertensive drugs. However, there are potential problems with this drug therapy including side effects and a consequent lowering of the quality of life (Croog et al., 1986; Houston, 1989). Therefore, there is considerable interest in treating these patients with non-pharmacological therapies, either alone or in combination with antihypertensive medication. Reports have also suggested efficacy with mind–body intervention methods for the control of high blood pressure (BP). These include techniques such as meditation, relaxation, autogenic training, and stress management (Davison et al., 1991; Schneider et al., 1995).

The authors' recent reports indicate that Qigong is effective in lowering BP via the reduction of norepinephrine, epinephrine, and cortisol levels (Lee et al., 2003a, 2003b). Studies of the effects of exercise on lipid metabolism verify the underlying mechanism and

beneficial effectiveness of exercise on hypertension patients. In addition, there have been a few reports of the effects of Qigong on lipid metabolism in hypertension patients. Therefore, the authors sought to investigate the effect of Qigong on blood lipids, such as high-density lipoprotein (HDL) cholesterol, Apolipoprotein A1 (Apo-A1), total cholesterol (TC), and triglycerides (TG), in hypertensive middle-aged. patients.

MATERIALS AND METHODS

Subjects

Blood pressure was measured in a sitting position during at least three different occasions in the outpatient clinic of Mokpo Catholic University Hospital. Patients with secondary forms of hypertension were excluded on the basis of a complete history and physical examination, radiological and ultrasound examinations, and urinalysis. One hundred and five exhibited a resting BP in the range of essential hypertension and 46 volunteered to participate in the study. They were assigned to either the Qigong group (n = 23) or the control group (n = 24) by their place of origin to avoid regional variations. Thirty-six of these 46 subjects participated in this study (Qigong: n = 17; control: n = 19).

The study received institutional approval from the Human Investigation Committee, and administrative approval from the facility before approaching subjects. A written consent form, prepared by the Human Subjects Review Board in Catholic University Hospital, was obtained from each subject.

Measurement of Blood Pressure

After 10 min of rest, the patient's blood pressure was measured by the auscultatory method (Deluxe Aneroid Spygmomanometer, Maccheck, Japan) with a contact microphone secured on the left brachial artery. Two assistants measured the BP and the results were averaged.

Analysis of Lipid Metabolism

HDL levels were measured by an automated precipitation method (Boehringer Mannheim GmbH, Mannheim, Germany). The concentrations of TC and TG were measured by enzymatic techniques and APO-A1 by immunoturbidimetry.

Intervention

The experimental treatment was conducted using Shuxinpingxuegong, which was developed in China by Zhang Guang De. Shuxinpingxuegong is composed of eight types of movement that have been known empirically to benefit the subject by preventing and treating circulatory system disease, but this has not been scientifically proved (Lee et al., 2003a). Before Qigong exercise, and to validate that this technique was appropriate for high-blood-pressure patients, a group of three athletic-physiology professors and two Qigong experts helped to reconstruct this technique as a warm-up exercise, Qigong exercise, and cool-down exercise. To test the effect of Qigong exercise, the magnitude and strength of Qigong exercise was measured with a change in the indirect heartbeat and calculated the target heart rate that was used to determine the exercise strength. This experiment allowed the careful design of the exercise strength not to exceed the 50–60% maximum exercise capacity.

The warm-up exercise, which was designed for relaxing the body, comprised a sequence of exercises involving breathing, the neck, the arms, the waist, and the legs. The main principle of Qigong exercise is to inhale when the muscle is contracting and exhale when the muscle is relaxing. This exercise ranged from the first method of two-arm motion to the eighth method of waist massage. The cool-down exercise was performed with the magnetic-massage method in which a subject has his or her head touched while the hands and legs are massaged lightly for about 5 min.

The entire exercise time was about 30 min, and this included the warm-up (5 min). the Qigong exercise (20 min), and the cool-down exercise (5 min). The exercise was performed around 3 p.m. and 5 p.m. with a Qigong exercise expert and experimenter while watching a recorded videotape in a quiet place, with the temperature maintained at 18 to 22°C.

Experimental Procedures

All testing was conducted at the Catholic Center at Mokpo in Korea. Prior to the intervention (before) and eight weeks after (after), 5 ml of blood was collected at 8 a.m. to measure lipid metabolism. Subjects were asked to refrain from food, coffee, tea, and smoking for at least 4 h before the assessment and to refrain from alcohol for at least 24 h before sampling. In addition. other measurements were performed before the experiment to measure baseline values and after eight weeks to see the effects of the intervention.

Statistical Analysis

The results obtained were statistically analyzed using SAS. The unpaired *t*-test and χ^2 was used to evaluate statistical differences in the demographic data and comparison of group differences between the control and Qigong groups. The paired *t*-test was used to analyze the differences between baseline (before) and eight week (after) values.

RESULTS

The demographic characteristics for the Qigong and control groups are shown in Table 1. The groups did not differ significantly in age, height, weight, sex, religion, job, and education.

Changes in systolic blood pressure (SBP) and diastolic blood pressure (DBP) are presented in Figure 1. Mean basal values of SBP and DBP were not different between the two groups. After eight weeks of intervention, SBP and DBP in the Qigong group were significantly different from the controls (SBP: $p < .001$; DBP: $p < .001$). There were significant changes in SBP and DBP in the Qigong group after eight weeks compared with before (SBP: $p < .001$; DBP: $p < .001$). There was also significant change in the DBP of the control group ($p < .01$).

In response to the eight weeks of intervention, there were significant differences between the Qigong and control groups in HDL ($p < .01$) and APO-A1 ($p < .01$). After eight weeks of intervention,

TABLE 1. Homogeneity for demographic characteristics of subjects

	Qigong (n = 17)	*Control (n = 19)*	*t or* χ^2	*p*
Age (yr)*	52.6 ± 5.1	54.3 ± 5.5	–0.47	0.61
Height	159.4 ± 6.6	161.8 ± 4.7	–0.53	0.57
Weight	66.4 ± 8.5	65.2 ± 6.7		
Sex			0.87	0.30
Male	8 (47.1%)	6 (31.6%)		
Female	9 (52.9%)	13 (68.4%)		
Religion			3.45	0.19
Yes	7 (41.2%)	8 (75.9%)		
No	10 (58.8%)	11 (24.1%)		
Job			0.19	0.70
Yes	9 (52.9%)	11 (57.9%)		
No	8 (47.1%)	8 (42.1%)		
Education			3.63	0.77
Primary	3 (17.7%)	4 (19.4%)		
Middle	4 (23.5%)	6 (31.6%)		
High	10 (58.9%)	9 (47.3%)		

*Values are expressed as mean ± SD.

TC ($p < .05$), HDL ($p < .001$), and APO-A1 ($p < .05$) changed significantly compared with before in the Qigong group (Figure 2).

DISCUSSION

The present study was undertaken in order to investigate whether Qigong affects lipid metabolism in middle-aged hypertension patients. The authors found that SBP and DBP were significantly reduced by Qigong, but not in the wait-listed control. In addition, a statistically significant change in TC, HDL, and Apo-A1 levels was revealed in the Qigong group, but not in controls.

BP (SBP and DBP) decreased after eight weeks of Qigong (twice a week), but remained the same in the control. The authors previously reported that 10 weeks of Qigong (three times a week) decreased blood pressure, other blood pressure determinants, and blood catecholamines in hypertension patients (Lee et al., 2003b). The authors proposed that the underlying mechanism of blood pressure reduction may be the decrease in norepinephrine, epinephrine, and SNS. In this study, eight weeks of Qigong (twice a week) could be enough to stabilize the SNS activity and then reduce blood pressure.

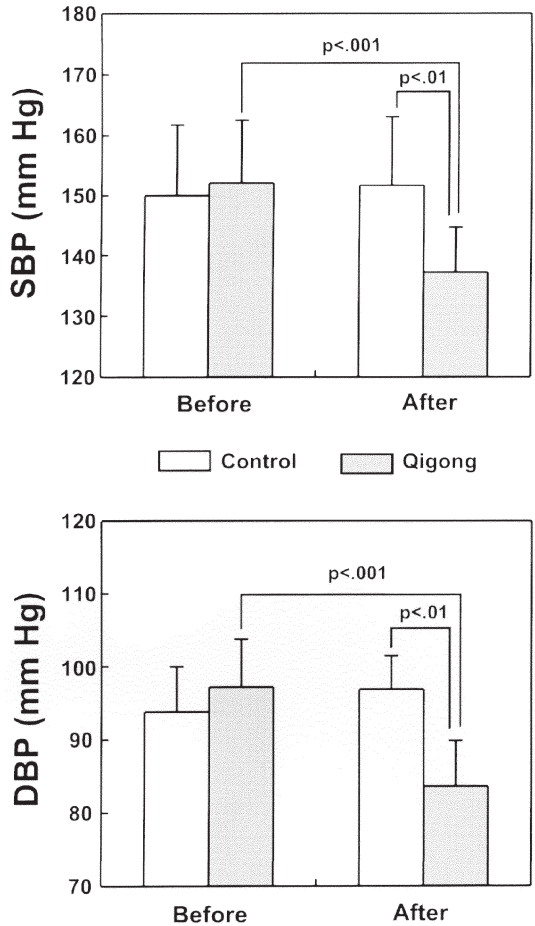

FIGURE 1. Variations of (A) SBP and (B) DBP (with SD) during the 8-week study for Qigong (n = 19) and control group (n = 17).

From the results obtained for lipid metabolism, it may be considered that Qigong had beneficial effects on reducing TC, HDL, and Apo-A1. There have been similar results in other studies of Qigong on BP. Qigong in randomly assigned controlled group studies led to fewer cardiovascular lesions, decreased blood viscosity, improved platelet aggregation, decreased triglycerides, and increased high-density lipoprotein cholesterol (HDL) in the practicing groups (Kuang et

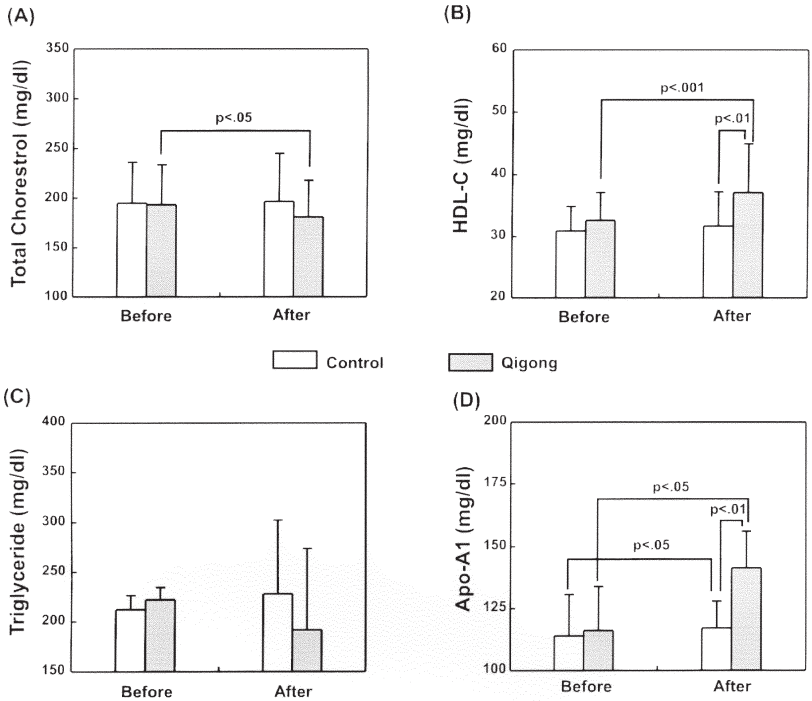

FIGURE 2. Changes of (A) total cholesterol (TC), (B) high-density lipoprotein (HDL) cholesterol, (C) triglycerides (TG), and (D) apolipoprotein A1 (APO-A1) by 8 weeks of Qigong.

al., 1991). Xian et al. (1990) report that after six months of practice, blood from the group practicing Qigong showed a decreased tendency to form abnormal blood clots and contained significantly higher levels of HDL.

In addition, it can hypothesized that other underlying mechanisms of reducing BP by Qigong stem from the results of changes in lipid level. Several studies of physical activity on hypertension reported that the dose-dependent relationship of lipid level with physical activity and reducing the lipid level may be beneficial to reduce blood pressure level (Ferrara et al., 2002; Nadar et al., 2002; Skoumas et al., 2002; Tsai et al., 2002). Skoumas et al. (2003) reported that a dose of physical activity was significantly associated with HDL and APO-A1 levels. The study revealed that even medium exercise is

adequate to increase HDL levels. Another study reported that even mildly increased serum cholesterol levels are able to influence BP, at least during sympathetic stimulation (Ferrara et al., 2002). Furthermore, Wierzbicki (2002) suggested that lipid lowering may provide an additional method of correcting hypertension in some high-risk patients. Because this study carefully designed the exercise strength not to exceed the 50–60% maximum exercise capacity, the exercise intensity of Qigong used in this study was moderate. Thus, the results of the present study are coincident with the results of Skoumas; that is, Qigong may be adequate to increase HDL levels. Taken together, a decreased level of TC and increased level of HDL and APO-A1 may indicate that Qigong has beneficial effects for reducing the blood pressure via a change to the lipid metabolism.

In summary, the results reveal that eight weeks of Qigong reduced blood pressure and changed lipid metabolism to benefit health. Furthermore, it can be hypothesized that Qigong has antihypertensive effects and reduces blood pressure via modulation of the lipid levels.

REFERENCES

Croog, S. H., Levine, S., Testa, M. A., Brown, B., Bulpitt, C. J., Jenkins, C. D., Klerman, G. L., & Williams, G. H. (1986). The effects of antihypertensive therapy on the quality of life. *New England Journal of Medicine, 314*(26), 1657–1664.

Davison, G. C., Williams, M. E., Nezami, E., Bice, T. L., & DeQuattro, V. L. (1991). Relaxation, reduction in angry articulated thoughts, and improvements in borderline hypertension and heart rate. *Journal of Behavioral Medicine, 14,* 453–468.

Ferrara, L. A., Guida. L., Iannuzzi, R., Celentano, A., & Lionello. F. (2002). Serum cholesterol affects blood pressure regulation. *Journal of Human Hypertension, 16*(5), 337–343.

Houston, M. C. (1989). New insights and new approaches for the treatment of essential hypertension: Selection of therapy based on coronary heart disease risk factor analysis, hemodynamic profiles, quality of life, and subsets of hypertension. *American Heart Journal, 117,* 911–951.

Kuang, A., Wang, C., Xu, D., & Qian, Y. (1991). Research on anti-aging effect of qigong. *Journal of Traditional Chinese Medicine, 11,* 153–158 and 224–227.

Lee, M. S., Lee, M. S., Choi, E. S., & Chung, H. T. (2003a). Effects of Qigong on blood pressure, blood pressure determinants and ventilatory function in middle-aged patients with essential hypertension. *American Journal of Chinese Medicine, 31*(3), 489–497.

Lee, M. S., Lee, M., Kim, H. J., & Moon, S. R. (2003b), Qigong reduced blood pressure and catecholamine levels of patients with essential hypertension. *International Journal of Neuroscience, 113,* 1691–1701.

Nadar, S., Lim, H. S., Beevers, D. G., & Lip, G. Y. (2002). Lipid lowering in hypertension and heart protection: Observations from the Anglo-Scandinavian Cardiac Outcomes Trial

(ASCOT) and the Heart Protection Study. *Journal of Human Hypertension, 16*(12), 815–817.

Schneider, R. H., Staggers, F., Alxander, C. N., Sheppard, W., Rainforth, M., Kondwani, K., Smith, S., & King, C. G. (1995). A randomised controlled trial of stress reduction for hypertension in older African Americans. *Hypertension, 26,* 820–827.

Skoumas, J., Pitsavos, C., Panagiotakos, D. B., Chrysohoou, C., Zeimbekis, A., Papaioannou, I., Toutouza, M., Toutouzas, P., & Stefanadis, C. (2003). Physical activity, high density lipoprotein cholesterol and other lipids levels, in men and women from the AFTICA study. *Lipids in Health Disease, 2,* 3.

Tsai, J. C., Liu, J. C., Kao, C. C., Tomlinson, B., Kao, P. F., Chen, J. W., & Chan, P. (2002). Beneficial effects on blood pressure and lipid profile of programmed exercise training in subjects with white coat hypertension. *American Journal of Hypertension, 15*(6), 571–576.

Wierzbicki, A. S. (2002). Lipid lowering: Another method of reducing blood pressure? *Journal of Human Hypertension, 16*(11), 753–760.

Xian, Z. H., Li, W., & Pi, D. R. (1990). Effect of qigong on blood pressure and life quality of essential hypertension patients. *Chung Kuo Chung His I Chieh Ho Tsu Chih, 7,* 413–414.