Impact of Qigong Exercise on Self-Efficacy and Other Cognitive Perceptual Variables in Patients with Essential Hypertension

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ABSTRACT

Objectives: The purpose of this study was to investigate the impact of practicing qigong on middle-age subjects with essential hypertension. Impacts on blood pressure, reported self-efficacy, perceived benefit, and emotion were observed.

Design: Thirty-six (36) adult volunteers were assigned to either a waiting list control or a qigong group that practiced two 30-minute qigong programs per week over 8 consecutive weeks.

Results: Systolic and diastolic blood pressure was significantly reduced in members of the qigong group after 8 weeks of exercise. Significant improvements in self-efficacy and other cognitive perceptual efficacy variables were also documented in the qigong group compared to the original situation described above.

Conclusions: This pilot study demonstrates the positive effects of practicing qigong on controlling blood pressure and enhancing perceptions of self-efficacy.

INTRODUCTION

Essential hypertension is defined as high blood pressure (BP) with no detectable medical cause or organ pathology; it is a treatable risk factor for cardiovascular disease (Turner, 1994). Untreated hypertension increases the risk for heart failure, stroke, and renal failure (Johnston, 1991). The standard medical treatment for essential hypertension consists primarily of antihypertensive drugs. However, drug therapy has unwanted side-effects that can reduce the quality of life (Croog et al., 1986; Houston, 1989). In response to this concern, there has been increasing interest in non-pharmacologic treatment of hypertension (Frumkin et al., 1978; Joint National Committee, 1986). Behavioral interventions such as meditation, yoga, and biofeedback have been reported to be effective in controlling high BP (Henderson et al., 1998; Schneider et al., 1995; Sundar et al., 1984). Unlike these self-help relaxation interventions, qigong incorporates exercises for posture, breathing, movement, and meditation.

The documented health benefits of qigong include the prevention and treatment of all causes of mortality including coronary artery disease and cancers (Chen and Yeung, 2002; Sancier, 1996). Although most qigong styles bestow some health benefits, medical qigong has been specifically developed for the purpose of the treatment and cure of disease. Medical qigong refers to the qigong forms used by qi practitioners to utilize vital energy (qi) in the diagnosis and treatment of various diseases. Although qigong is mainly a self-training method, internal qigong developed by individual practice is more beneficial in promoting good health through self-help.

We have reported that qigong is useful for the treatment of psychosomatic and stress-related disorders (Lee et al., 1998, 2000a). In preclinical and postclinical studies, qigong has effectively reduced blood pressure and catecholamines in patients with essential hypertensive (Lee et al., 2003). Furthermore, qigong has been reported to reduce sympathetic activity, and enhance parasympathetic activity (Lee et al., 2002).

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Although Sancier (1996) suggested that qigong has beneficial effects in patients with hypertension, other reviews have noted methodological flaws in previous studies. Mayer (1999) reviewed more than 70 studies on the effects of qigong on hypertension and commented that the weight of evidence of 33 studies representing 5545 subjects suggests that qigong has a positive effect on hypertension. However, because of methodological issues in these studies, Mayer found it difficult to determine the effectiveness of qigong precisely and to identify other factors that might contribute to the previously reported positive effects. Jonas and Crawford (2003) also questioned the quality of research in studies reporting a positive effect from qigong. To document the effects of qigong on hypertension, the previous research should be repeated and extended through more rigorously designed studies, such as randomized controlled studies and high quality replications.

The concept of self-efficacy has been used in recent years as an index of an individual’s beliefs and confidence in performing certain health behaviors to manage conditions such as arthritis, back pain, fibromyalgia, and cancer (Culos-Reed and Brawley, 2000; Damush et al., 2003; Davis et al., 2000; McAuley et al., 1995; Rhee et al., 2000; Weber et al., 2004). In addition, the process of behavior performance encompasses evaluating one’s personal cognitive thought, knowledge, emotions, the social environment, and the consequences of performing the behavior (Marlatt and Murphy, 1996; Nicki et al., 1985; Strecher et al., 1986). Self-efficacious people are characterized by persistence, commitment, resourcefulness, and perseverance. The majority of studies report an increase in self-efficacy after a period of physical training (Brekke et al., 2003; McAuley et al., 1991, 1994). However, there is little reported evidence of the effects of qigong on self-efficacy and cognitive variables.

The primary purpose of this study was to test the hypothesis that practicing qigong twice each week for 8 weeks would reduce blood pressure in patients with essential hypertension. The second aim was to examine the effects of qigong on self-efficacy and cognitive variables.

**MATERIALS AND METHODS**

**Participants**

Sedentary and middle-aged subjects with essential hypertension were recruited through bulletin board advertising to participate in an 8-week qigong program as subjects for the present study. An individual was eligible to participate in the program if he/she was: (1) between 40 and 65 years of age, (2) sedentary, as defined by a lack of regular exercise during the previous 6 months, (3) exhibited resting BP in the sitting position in the range of essential hypertension (140 mm Hg < systolic blood pressure [SBP] < 180 mm Hg and 90 mm Hg < diastolic blood pressure [DBP] < 105 mm Hg) without any complication related to hypertension, and (4) not receiving any medication for hypertension. A total of 46 subjects volunteered to participate in the study. They were assigned to either a qigong group (n = 22) or a control group (n = 24) according to their place of residence, to avoid the contamination that could occur if subjects living close to each other discussed their participation in the study. From eight large, administratively divided provinces, we assigned them to two groups according to distance from the hospital.

Of these 46 candidates, 36 subjects participated in the study (qigong, n = 17, 52.6 ± 5.1 years of age; control, n = 19, 54.3 ± 5.5 years). Ten (10) subjects withdrew because of family or work situations (6), unwillingness to continue (3), or because they were going on a long business trip (1). Thus, we could not measure the blood pressure and scores for psychologic variables in these 10 subjects.

**Measurement of blood pressure**

After a 10-minute preintervention rest, blood pressure was measured by the auscultatory method with a contact microphone secured over the left brachial artery. Two assistants measured BP consecutively, twice for each subject, and the four values were averaged.

**Cognitive perceptual variables**

**General self-efficacy.** The general self-efficacy (GSE) scale aims to establish the patient’s broad and stable sense of personal competence in dealing with a variety of stressful situations. The Korean translated version of this scale was originally developed by Sherer et al. (1982) as a 14-item version, but was reduced to a 10-item version for patients with hypertension in this study. We excluded four items because our pilot study showed that they were difficult for Koreans to understand and because they overlapped with other items in the Korean translation of the GSE. The answers are rated on a 10-point scale ranging from “not at all” (0) to “completely” (10). The Cronbach’s α value for internal consistency was 0.86 for the original version and 0.905 for our study.

**Exercise self-efficacy (ESE).** In this study, subjective changes in self-efficacy were assessed using an exercise self-efficacy (ESE) instrument developed for Koreans. It con-
sists of 8 items and the level is rated on a 10-point scale ranging from “not at all” (0) to “completely” (10) with a high level of internal consistency (Cronbach $\alpha = 0.932$).

Perceived benefit on exercise

The Korean translated version of perceived benefit (PB) on exercise is an 11-item scale originally invented by Walker (1987) and used in Kim’s thesis (1994). It uses a 5-point response format to record the subject’s thoughts on the benefit of health-promoting exercise. It has good reliability and validity (Cronbach $\alpha = 0.834$).

The effect of emotional state on exercise

The scale to measure the effect of emotion on exercise (EE) consists of two items developed by Kim (1994) from a previous study; the Cronbach $\alpha$ was 0.69 in the study by Kim and 0.742 in this study). The scale uses a five-point response format to record the subject’s emotional on the health-promoting exercise. A higher score means a stronger effect of emotional state on exercise.

Intervention

The experimental treatment was conducted using the Shuxinpingsuexegong method developed by the Chinese practitioner Zhang Guang De. Comprising eight types of movement (Lee et al., 2003), the Shuxinpingsuexegong method is used empirically to prevent and treat circulatory system diseases but has not been scientifically validated. To validate that this instrument was appropriate for the patients with high-blood pressure before the qigong exercise was conducted, a group of three sports physiology professors and two qigong experts helped to reconstruct this instrument as a warm-up exercise, qigong exercise, and cool-down exercise.

The time taken for the exercise including warm-up (5 minutes), the qigong exercise (20 minutes), and cool-down exercises (5 minutes) totaled approximately 30 minutes. Subjects were told to inhale when they contracted their muscles and exhale when they relaxed their muscles.

This qigong exercise started with a two-arm motion (stage 1) and ended with a massage-like procedure (stage 8) as follows. In these instructions to patients, the words in parentheses indicate alternative limbs, positions, or movements.

1. Standing in an upright relaxed posture, begin with the feet and knees together. Look straight ahead. Raise the arms up in front (side) to shoulder height slowly while breathing in. Lower the arms back to their original position while breathing out.

2. Turn slightly to the left (right) and lift the arms upward to the front on the left side of the body, raise both hands vertically and circle outward and step with left (right) foot. Push the trunk forward while lifting the right (left) leg and make a circle with both hands facing inward.

3. Bend both knees. Step sideways with the left (right) foot into horse-riding stance with both arms extended out in front at shoulder height. Extend the elbows out to the sides, push the palms upwards, and straighten the legs.

4. Sink down and step sideways with the left (right) foot into the horse-riding stance with arms extended out to the sides at shoulder height and smoothly shake both hands up and down approximately 5 to 8 times.

5. Massage twice every corner of the brow and over the head to the neck, maintaining contact with the face. Massage with the forefingers the inside (outside) of the ear (right) foot, use the top of the left (right) foot to hit behind the knee of the right (left) leg.

6. Turn from the waist to the left (right) and hit the left (right) shoulder with the right (left) fist. Place the hands on the hips while looking straight ahead. Lift the left (right) foot, use the top of the left (right) foot to hit behind the knee of the right (left) leg.

7. Bend the knees and sink down. Step to the side with the left (right) foot as the arms are extended to the sides at shoulder height. Step outwards with right (left) foot. As the weight is shifted onto the right (left) leg, roll up successively the wrists, the back of the hands, the knuckles, then flick the fingers upwards and extend the arms out to the sides.

8. Turn to the left (right) and bend the knees while placing the palms onto the back (front) on either side of the spine just above (just below) the waist. Shift the weight forward onto the left (right) leg and massage the palms down the back (front) of either side of the spine to the hip level. At the end of the last movement, keep the palms on the Danqien for 20 seconds then slowly release the hands to the sides.

Qigong exercise was performed from 3:00 pm to 5:00 pm twice per week. The exercises were performed in a quiet place under the instruction of a qigong expert and a researcher. The environmental temperature was maintained in the range of 18°–22°C. We did not ask subjects to perform qigong at home.

Wait-list control. The control group was informed that they would practice qigong after an 8-week baseline period. The control group completed identical assessments to qigong group using the same schedule. After the 8-week period, the control group was offered complimentary qigong on a voluntary basis.

Experimental procedures. The qigong exercises and all testing were conducted in a public lecture hall at the Catholic Center at Mokpo. One (1) week before the beginning of the experiment, all subjects visited the public lecture hall to become familiar with the experimental conditions and procedures. The subjects were informed that they would receive
8 weeks of qigong, each of which could have beneficial effects on hypertension and other symptoms. We explained the nature of qigong and experimental procedures separately, according to group. Subjects were asked to refrain from smoking and consuming food, coffee and tea for at least 4 hours before the assessment and to refrain from drinking alcohol for at least 24 hours before the experiment.

The measurements were performed before the onset of the study to measure baseline values and were repeated after 8 weeks to assess the effects of the intervention. The cognitive measures were performed at rest 10 minutes or more before BP was measured. Four assistants helped the subjects complete the questionnaires and measured the subjects’ BPs.

### Statistical analysis

Data were analyzed using SAS software (Statistical Analysis System, SAS Institute Inc., Cary, NC). Unpaired t tests were used to evaluate statistical differences of demographic data and comparison of group differences between the control and qigong-training group. Paired t tests were used to analyze the differences between baseline and after 8-week values.

### RESULTS

Changes in SBP and DBP are presented in Table 1. Mean basal values of SBP and DBP were not different between the two groups. After 8 weeks of intervention, the SBP and DBP of the qigong group were significantly different to the control (SBP: \( p < 0.001 \); DBP: \( p < 0.001 \)). There were significant changes in SBP and DBP in the qigong group after 8 weeks (SBP: \( p < 0.001 \); DBP: \( p < 0.001 \)). There was a significant change in DBP in the control group (\( p < 0.01 \)).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP (mm Hg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qigong</td>
<td>152.0 ± 10.5</td>
<td>137.3 ± 7.5(^a,b)</td>
</tr>
<tr>
<td>Control</td>
<td>150.0 ± 11.8</td>
<td>151.7 ± 11.3</td>
</tr>
<tr>
<td>DBP (mm Hg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qigong</td>
<td>97.2 ± 6.5</td>
<td>83.6 ± 6.2(^a,b)</td>
</tr>
<tr>
<td>Control</td>
<td>93.8 ± 6.2</td>
<td>96.9 ± 4.6(^c)</td>
</tr>
</tbody>
</table>

All results are presented as mean ± SD. Pre indicates before qigong; Post, after 8 weeks of qigong.

\( ^a p < 0.001 \) versus Pre.

\( ^b p < 0.001 \) versus control group at the Post time point.

\( ^c p < 0.01 \) versus Pre.

SBP, systolic blood pressure; DBP, diastolic blood pressure; SD, standard deviation.

### Table 2. Changes in Cognitive Perceptual Efficacy Before and After Eight Weeks in the Qigong and Control Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>General self-efficacy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qigong</td>
<td>64.0 ± 13.4</td>
<td>71.4 ± 15.3(^a,b)</td>
</tr>
<tr>
<td>Control</td>
<td>70.3 ± 15.2</td>
<td>64.3 ± 13.5(^c)</td>
</tr>
<tr>
<td>Exercise self-efficacy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qigong</td>
<td>65.0 ± 14.3</td>
<td>73.3 ± 14.3(^a,d)</td>
</tr>
<tr>
<td>Control</td>
<td>59.5 ± 16.9</td>
<td>55.7 ± 16.8</td>
</tr>
<tr>
<td>Perceived benefit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qigong</td>
<td>3.34 ± 0.50</td>
<td>3.98 ± 0.44(^a,b)</td>
</tr>
<tr>
<td>Control</td>
<td>3.76 ± 0.53</td>
<td>3.40 ± 0.42(^c)</td>
</tr>
<tr>
<td>Emotion on exercise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qigong</td>
<td>3.16 ± 0.38</td>
<td>3.98 ± 0.57(^a,b)</td>
</tr>
<tr>
<td>Control</td>
<td>3.36 ± 0.44</td>
<td>3.19 ± 0.65</td>
</tr>
</tbody>
</table>

All results are presented as mean ± SD. Pre indicates before qigong; Post, after 8 weeks of qigong.

\( ^a p < 0.001 \) versus Pre.

\( ^b p < 0.001 \) versus control group at the Post time point.

\( ^c p < 0.05 \) versus Pre.

\( ^d p < 0.01 \) versus control group at the Post time point.

SD, standard deviation.
QIGONG EFFECTS ON SELF-EFFICACY IN HYPERTENSION

0.01), ESE (p < 0.05), PB (p < 0.01) and EE (p < 0.01). There were significant increases in all cognitive perceptual efficacy variables in the qigong group, while there were significant decreases in GSE and PB of the control group.

Ten subjects (59%) in the qigong group wished to continue the exercises at home after the trial ended and we gave them a videotape of qigong exercise. They continued to perform self-help home qigong exercise for at least 2 months; we did not inquire about their continued practice after 2 months.

DISCUSSION

In this study, subjects who did qigong exercises twice per week for 8 weeks showed more improvement in blood pressure than the wait-list control group. Participants also reported that qigong influenced cognitive perceptual variables.

BP (SBP and DBP) decreased after 8 weeks of qigong exercise, but remained the same in the control group. These results are similar to those reported in other qigong studies. Many groups have assessed the effects of qigong on hypertensive patients and have reported that receiving qi positively affects BP, levels of catecholamines and cholesterol, heart rate, and other aspects of health (Agishi, 1998; Bornoroni et al., 1993; Lee et al., 2000b, 2003; Xing et al., 1993). BP has been directly linked to sympathetic nervous system (SNS) activity, and the urinary catecholamine assay has been used as an integrated measure of sympathoadrenal system activity (SSA)—a unique neuroendocrine unit comprising the sympathetic nervous system and the adrenal glands (Macdonald, 1995). Hence, lower BP levels following qigong exercise are compatible with the stabilization of SNS activity, because BP has been shown to be directly linked to SNS activity.

From the results obtained for the cognitive perceptual variable, it may be considered that 8 weeks of practicing qigong has beneficial effects on self-esteem and health. According to Bandura (who advanced the construct of perceived self-efficacy), the higher one’s self-efficacy, the greater one’s accomplishment, although the expectation of self-efficacy is subjective and situation-specific (Bandura, 1977, 1982, 1984, 1991). Many studies have accepted the assumptions of this theory; that is, perceived self-efficacy predicts successful individual task performance during and following treatment (Gist et al., 1991; McAuley, 1994, 1995). Increased self-efficacy was positively related to maintaining health-promoting behaviors in a previously reported longitudinal study (Brekke et al., 2003). Increases in perception of self-efficacy and other cognitive perceptual variables indicate that qigong may influence subjects’ feelings about their health promotion and willingness to improve. qigong may affect health behavior that helps patients maintain self-care and ultimately enable them to continue qigong.

In conclusion, the results show that qigong reduces blood pressure levels and improves cognitive perceptual variables. These results indicate that qigong has stabilized the SNS in patients with essential hypertension, and improves self-esteem and maintains participation in a self-care program. Finally, a qigong program for hypertension support effectively improved self-efficacy by enhancing participants’ abilities to practice qigong regularly and accurately. However, we acknowledge that this was a preliminary study with several limitations, such as a small sample size and the lack of an equivalent placebo-control group to estimate an expectation effect. Further randomized studies that include more objective measures, larger sample sizes, measurements after multiple sessions, and long-term follow-up are needed to convincingly show the effects of qigong on well-being or other psychologic variables in patients with cardiovascular diseases.

REFERENCES


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