1) Title:

The Effect of Qi-gong Relaxation Exercise on the Control of Type 2 Diabetes Mellitus: A Randomized Controlled Trial

2) Short running title:

Qi-gong Relaxation on Type 2 Diabetes

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Letter to the editor:

Qi-gong relaxation exercise is one of the traditional Chinese health care self-management technique. It consists of two aspects, controlled synchronized breathing with slow body movements as an aerobic exercise, and relaxation (1). The purpose of this study was twofold: to examine the effects of Qi-gong and to identify biological and psychological characteristics associated with a positive response to therapy.

The study used a paired group design with age and sex matched participants randomly assigned to one of two groups. Of the 554 eligible patients, thirty-six type 2 diabetes were randomized to the study. This study was ethically approved by the board of directors of Science Clinic and informed consent was obtained from all 36 patients. For a variety of reasons, 10 of these subjects were excluded from analysis resulting in data reported on 26 participants. The First Group (16 patients, age 65.3± 7.7) received the initial four months intervention while the Second Group (10 patients, age59.1± 9.0) served as a control. Then the intervention was repeated for the second group. Weekly two-hour Qi-gong group sessions were held by a Chinese Qi-gong doctor, and subjects were also requested to practice Qi-gong at home. Conventional diabetes therapies such as pharmacotherapy, dietary and exercise treatment, were not modified during the study period.

HbA1c levels were measured. It changed as follows: 8.13±1.73 before treatment, 7.33±1.09 after treatment in the First Group, 8.29±1.63 before control period, 8.17±1.30 before treatment, and 7.23±0.90 after treatment in the Second Group. Compared to the control period of the Second Group, the First Group demonstrated significant improvements in HbA1c level ($p<0.01$) by ANCOVA using pre-HbA1c as a covariate. In the Second Group, HbA1c level significantly decreased by the delayed treatment indicated by a one-way layout ANOVA ($F=7.26$, $p<0.005$). By Tukey's HSD multiple comparison test, no

significant change was found between before and after the control period, but a significant improvement was ascertained between before control and after treatment ($p<0.01$), and between before and after treatment ($p<0.05$). The changes of other biological and psychological factors in the combined data of the First and Second Group were compared by paired t-tests or Wilcoxon signed-ranks tests. While there were no significant changes in caloric intake, caloric consumption, body mass index, and lipid metabolism, significant improvements in C-peptide ($p<0.05$) were demonstrated. Some psychological improvements were demonstrated, including the anxiety index ($p<0.05$) and total scores ($p<0.05$) of the Mood Inventory (2). The improvement in HbA1c could be predicted (total 86.3% variance, $F=25.145$, $p<0.0001$) by higher pre-HbA1c (70.8%, $p=0.0001$), younger age (6.6%, $p=0.002$), trend of obesity (2.2%, $p=0.01$), stronger self-efficacy (3) (2.5%, $p=0.08$), and weaker personality trait of alexithymia which means difficulty in identifying and describing one's own emotions (4) (1.9%, $p=0.04$) on multiple regression analysis.

Because obese patients benefited more and the significant decrease in C-peptide was demonstrated in this study, Qi-gong may improve the insulin resistance. On the other hands, as several studies described the effects of relaxation training for type 2 diabetes (5-8), Qi-gong can improve glucose metabolism by the benefits of relaxation response. In conclusion, these findings suggest that Qi-gong relaxation exercise may be a beneficial adjunctive treatment for individuals with type 2 diabetes.

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