A Qualitative Review of the Role of Qigong in the Management of Diabetes

LIU XIN, M.Ed., YVETTE D. MILLER, Ph.D., and WENDY J. BROWN, Ph.D.

ABSTRACT

Objective: To review the evidence relating to the effectiveness of qigong in the management of diabetes.

Methods: We performed a systematic literature review of qigong intervention studies published in English or Chinese since 1980, retrieved from English-language databases and Chinese journals. Qigong intervention studies conducted with adults with diabetes, which reported both preintervention and postintervention measures of fasting blood glucose and/or hemoglobin A1c (HbA1c) were included. Sample characteristics, intervention frequency/duration, and metabolic outcomes were reviewed.

Results: Sixty-nine intervention studies were located. Of these, only 11 met the criteria for inclusion. There were consistent and statistically significant positive associations between participation in qigong and fasting and 2-hour oral glucose tolerance test results, blood glucose, and triglycerides and total cholesterol. Effects on insulin and HbA1c were inconsistent. There was no evidence of any effect of qigong on weight. Most of the studies were of short duration, involved small samples, and did not include a control group.

Conclusions: Although qigong has beneficial effects on some of the metabolic risk factors for type 2 diabetes, methodologic limitations make it difficult to draw firm conclusions about the benefits reported. Randomized controlled trials are required to confirm the potential beneficial effects of qigong on the management of type 2 diabetes.

INTRODUCTION

As its potential for improving general health has become more widely recognized, the practice of qigong has become more popular in Western countries. This traditional Chinese exercise, which is often practiced as a component of t’ai chi, is widely recognized in China as a “medical exercise” in its own right, having been practiced for thousands of years as a part of Traditional Chinese Medicine (TCM). Qigong is a type of “moving meditation,” characterized by a unique combination of mental and physical training, combining slow, deep, diaphragmatic breathing and relaxation with spiral and circular movements of skeletal muscles, transference of weight, and adoption of specific “postures,” which are linked to the yin and yang theory of TCM. Qigong can be conducted in “static” (sitting, lying, or standing) or “dynamic” (moving) styles, and is generally easier to master than t’ai chi. Qigong can be practiced alone as a home-based activity, or in groups, with the potential added benefits of social support.

In recent years, there has been increased research interest in the potential of qigong for the prevention and treatment of several health problems, including cancer and asthma.1–3 Recent reports of the increasing prevalence of type 2 diabetes in both Eastern and Western countries4,5 have also now directed more specific research attention to the effects of qigong on diabetes management.6–16 According to Chinese medicine, the benefits of qigong for diabetes control are achieved through enhancing glucose uptake by skeletal muscles and by improving the action of the beta cells in the pancreas. The specific patterns of movement and breathing in qigong involve coordination of many muscle groups, as well as “free circulation of energy and blood flow,” which, according to theories of TCM, underpin the therapeutic effects of qigong.
Qigong may also affect diabetes control through its stress-reducing properties. In 2003, Lee et al. demonstrated reductions in norepinephrine, epinephrine, cortisol, and self-reported stress following 10 weeks of qigong training, and these improvements were significantly different from those in controls without training.17 Stress can have stimulatory effects on insulin antagonists such as cortisol, adrenaline, glucagon, and growth hormone, which may affect glucose control adversely, and lack of improvement or deterioration in glycemic control has been associated with the experience of personal stressors.18

There appear to be several possible mechanisms for the potential of qigong to influence glycemic control positively among people with diabetes. Because little evidence about the effectiveness of qigong for diabetes management is readily available in the western scientific literature, the aim of this paper is to provide a qualitative review of contemporary evidence about the effectiveness of qigong as an intervention strategy for the management of diabetes.

METHODS

A systematic literature search was conducted to identify evidence relating to the effectiveness of qigong interventions in the treatment of type 2 diabetes. PubMed and MEDLINE® electronic databases were utilized with the search terms physical activity, exercise, diabetes, adult onset diabetes, type 2 diabetes, impaired fasting glucose, impaired glucose tolerance (IGT), metabolic syndrome, qigong, qi gong, chikung, chi kung. The search strategy also included a hand search of all volumes of the Chinese Journal of Sports Medicine, Chinese Journal of Diabetes, Chinese Journal of Integrated Western and Eastern Medicine, Chinese Journal of Rehabilitation Medicine, Journal of Chinese Qigong, and the content of international websites related to alternative medical approaches to diabetes prevention and management (e.g., www.alternativehealing.org/diabetes_qigong_therapy.htm).

We included both English- and Chinese-language papers published since 1980 that reported on qigong intervention trials on diabetes. Single-session trials, case studies, studies that did not objectively measure diabetes-related outcomes or did not report the magnitude of changes in those outcomes, and studies on animals were excluded. For inclusion in this review, studies were also required to report objective measures of fasting blood glucose and/or HbA1c before and after qigong. When units of outcome measures were reported in mg/dL, these were converted to mmol/L using an established conversion formula.19

RESULTS

A total of 69 intervention studies published in English or Chinese since 1980 were located, but 58 of these did not meet the inclusion criteria for this review and were excluded. Reasons for exclusion were that 1 trial was a single-session trial, 18 were case studies, 23 did not measure diabetes-related outcomes objectively or did not report the magnitude of changes in those outcomes, 13 did not report pre- and post-qigong measures of fasting blood glucose and/or HbA1c and 3 were conducted with rats. Eleven studies met the inclusion criteria for this review, and all but one16 were conducted in China. A summary of each of these studies is provided in Table 1. Effects are reported with the specificity provided by the authors. Details about the magnitude of changes in outcome variables, the composition of the samples, and the frequency and duration of qigong participation sessions were not consistently reported.

Only one of the 11 studies included a control group.16 Most of the studies were conducted with samples of adults with diabetes who were recruited from hospitals6,7,9,10,14 or clinics8,11; 5 studies included only participants with type 2 diabetes8–10,12,16; 2 studies also included a small number of participants (2 each) with type 1 diabetes6,7; and 4 studies did not provide this information.11,13–15 The reported duration of the interventions ranged from 10 days13 to at least 3 years,15 although most were conducted for 3 weeks to 3 months. Three studies involved the dynamic (moving) style of qigong.7,9,12 4 studies used a combination of the dynamic and static styles,11,13–15 1 study used only the static style,8 and 3 studies did not provide this information.5,10,16 Group qigong training was conducted at least once per week in most trials, usually with recommended daily home training. At least some participants in most trials took medication for diabetes during the intervention period, but there was no dietary intervention in any of the trials reviewed here.

All 10 studies that reported changes in fasting blood glucose with qigong6–15 demonstrated decreases that ranged from 0.08 mmol/L10 to 5.65 mmol/L,6 and the majority of these were statistically significant changes. The preintervention levels of fasting blood glucose were lower in the 2 studies that did not demonstrate statistically significant changes in this measure8,10 than in those studies that did find such changes. Blood glucose was measured 2 hours after a glucose load in 2 trials, which reported decreases of 5.05 mmol/L after 3 months7 and 1.9 mmol/L after 1 month (p < 0.05),10 respectively.

Changes in fasting insulin were measured in 4 of the trials,7,9,12,14 with inconsistent effects. One study reported a decrease of 9.65 μU/mL after 20 days (p < 0.05),9 while another study (with quite intensive training for more than an hour and a half daily) reported an increase in fasting insulin of 5.58 μU/mL after 21 days.14 Only 1 of the trials reported changes in insulin at 2 hours after a glucose load, and found a nonsignificant increase of 8.5 μU/mL after 2–3 months.7

Two trials assessed changes in HbA1c. One of these reported almost no change, but assessed HbA1c after only 20 days,9 making assessment of HbA1c inappropriate. The other trial demonstrated a statistically significant decrease of 0.8% in HbA1c after 4 months of training, as compared with a de-
<table>
<thead>
<tr>
<th>Source</th>
<th>Participants</th>
<th>Intervention</th>
<th>Outcomes (preintervention + postintervention)</th>
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<tr>
<td>Du et al., 1985&lt;sup&gt;6&lt;/sup&gt; (China)</td>
<td>13 convalescent hospital inpatients, 9M, 4F T1DM: 2 T2DM: 11 Mean age: 52</td>
<td>Qigong 26 days</td>
<td>BW (kg) 16.10 FBG BG2h FIN IN2h HbA1c TG TCH or Change in BMI medication</td>
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<td>Shen et al., 1987&lt;sup&gt;7&lt;/sup&gt; (China)</td>
<td>20 hospital inpatients, 11M, 9F T1DM: 2, T2DM: 18 Mean age: 52.7 ± 7.3</td>
<td>Hexiangzhuang qigong (dynamic style) Twice daily, 7 times/week for 2–3 months</td>
<td>10.92 ± 4.3 21.08 ± 9.26 14.9 ± 7.8 37.2 ± 22.2 2.78 ± 1.93 6.12 ± 1.63 NS No change</td>
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<td>Tu et al., 1987&lt;sup&gt;8&lt;/sup&gt; (China)</td>
<td>14 clinic outpatients, 11M, 3F T2DM Age range: 49–66</td>
<td>Qigong (static style) 15–50 minutes (progressive) 3 times/week for 3 months</td>
<td>8.59 ± 3.77 &gt;&gt; 1.60 ± 0.56 5.52 ± 1.26 62.46 ± 7.95 NR</td>
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<td>Wu et al., 1988&lt;sup&gt;9&lt;/sup&gt; (China)</td>
<td>10 hospital inpatients, 73M, 3F T2DM Mean age: 52.7</td>
<td>Zikong Qigong (dynamic style) 30 minutes/session, twice daily, 7 times/week for 20 days</td>
<td>9.66 ± 3.66 23.8 ± 13.74 1.148 ± 0.23 3.69 ± 7.45 6.21 ± 1.44 68.15 ± 10.09 No change</td>
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<td>Wu et al., 1991&lt;sup&gt;10&lt;/sup&gt; China</td>
<td>24 hospital inpatients + 4 clinic outpatients, 14M, 14F T2DM</td>
<td>Zhenfa Qigong 1 month</td>
<td>7.11 12.93 &gt;&gt; p &lt; 0.05</td>
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<table>
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<tr>
<th>Source</th>
<th>Participants</th>
<th>Intervention</th>
<th>FBG (mmol/L)</th>
<th>BG2h (mmol/L)</th>
<th>FIN (µU/mL)</th>
<th>IN2h (µU/mL)</th>
<th>HbA1c (%)</th>
<th>TG (mmol/L)</th>
<th>TCH (mmol/L)</th>
<th>BW (kg)</th>
<th>Change in medication</th>
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<tr>
<td>Huaxia, 1994 (China)</td>
<td>120 attendees at rehabilitation clinic/qigong training center, 48M, 72F</td>
<td>Zhineng qigong (static) style plus dynamic style) 24 days</td>
<td>12.65 ± 1.08</td>
<td>&gt;&gt;</td>
<td>11.17 ± 2.31</td>
<td>p &lt; 0.01</td>
<td>0.01</td>
<td>6.75 ± 3.29</td>
<td>5.01 ± 2.80</td>
<td>10.8% stopped 88.5% reduced or no change</td>
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<tr>
<td>Jing et al., 1994 (China)</td>
<td>Recruitment source: NR N = 31 22M, 9F T2DM Mean age: 62.85</td>
<td>HuChun qigong (dynamic style) 10 days of daily group training, then 1 group session/week and recommended daily home training for 12 mths</td>
<td>10.19 ± 3.29</td>
<td>&gt;&gt;</td>
<td>6.93 ± 1.98</td>
<td>p &lt; 0.001</td>
<td>0.001</td>
<td>6.75 ± 3.29</td>
<td>5.01 ± 2.80</td>
<td>1.34 ± 0.71 5.51 ± 1.16 69.02 ± 9.84</td>
<td>No change</td>
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<td>Zhang et al., 1994 (China)</td>
<td>34 attendees at qigong training class</td>
<td>ZangMh qigong (static style plus dynamic style) 10 days of training</td>
<td>12.06 ± 3.79</td>
<td>&gt;&gt;</td>
<td>8.55 ± 3.59</td>
<td>p &lt; 0.01</td>
<td>0.001</td>
<td>6.75 ± 3.29</td>
<td>5.01 ± 2.80</td>
<td>NR</td>
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<td>Zhang (China)</td>
<td>16 hospital patients 6M, 10F Mean age: 59.3</td>
<td>Qigong (static style plus (dynamic style) 95 min/day, twice daily, for 21 days</td>
<td>7.627 ± 2.306</td>
<td>&gt;&gt;</td>
<td>5.138 ± 0.986</td>
<td>p &lt; 0.01</td>
<td>0.001</td>
<td>6.75 ± 3.29</td>
<td>5.01 ± 2.80</td>
<td>64% reduced 36% NR</td>
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<tr>
<td>Study</td>
<td>Recruitment data</td>
<td>Qigong intervention details</td>
<td>Months 1–4: intervention</td>
<td>Months 5–8: intervention</td>
<td>NS in BMI</td>
<td>No change</td>
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<td>Zhang et al., 199915 (China)</td>
<td>Source: NR, N = 14</td>
<td>Qigong (static style plus dynamic style) 1–2 h/day, 7 days/week for 3–4 years. Majority of participants did group exercise</td>
<td>11.51 ± 3.33 &gt;&gt; 8.21 ± 1.40</td>
<td>8.55 ± 2.43</td>
<td>8.17</td>
<td>No change</td>
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<td>Tsujinachi et al., 200216 (Japan)</td>
<td>Source: NR, N = 16 (T2DM)</td>
<td>Qigong 2 h/week of group training and recommended daily home training. Control group underwent intervention after 4 months</td>
<td>8.13 ± 1.73 &gt;&gt; 7.33 ± 1.09</td>
<td>8.17 ± 1.30</td>
<td>7.23</td>
<td>No change</td>
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M, male; F, female; FBG, fasting blood glucose; BG2h, blood glucose at 2 hours after glucose load; FIN, fasting insulin; IN2h, insulin at 2 hours post load; HbA1c, hemoglobin A1c; TG, triglycerides; TCH, total cholesterol; BW, body weight; BMI, body–mass index; T1DM, type 1 diabetes mellitus; T2DM, type 2 diabetes mellitus; NS, no significant change; NR, not reported.

Note: >> denotes compared with.
There were consistent decreases in total cholesterol across the 4 trials that measured it,7–9,12 and two of these decreases were statistically significant (p < 0.05).7,8,12 There were no significant changes in body–mass index (BMI) or body weight in the 5 trials that reported these variables.7–9,12,16 Relief of symptoms6,14 and reduced doses of medication6,11,14 (see Table 1) were reported in some trials, and 1 trial demonstrated significant improvements in some psychological measures such as anxiety (p < 0.05) and mood (p < 0.05).16

Although changes in diet and physical activity (other than that associated with the intervention) may explain the observed changes in many of the outcomes assessed, 5 studies8,10,11,13–15 did not report on changes in diet, and 106–15 did not report on changes in other physical activities. Five studies reported that there was no change in diet during the testing period,6,7,9,12,16 and 1 reported that there was no change in physical activity outside the intervention program.16

**DISCUSSION**

Ours is the first study to systematically review the evidence relating to qigong and diabetes management using papers from both the English- and Chinese-language literature. On the basis of the studies reviewed here, it is clear that sufficient evidence exists to suggest that qigong may positively affect some indicators of diabetes control. However, most of the published evidence in this field is from studies with serious design flaws, such as the lack of a control group, small sample size, and no reporting of potentially confounding variables.

The most consistent positive effects of qigong were demonstrated for blood-glucose measures (both fasting and 2-hour post–glucose-load values), and the data suggest that the magnitude of the changes in fasting blood glucose (0.08–5.65 mmol/L)6–15 after qigong training can be of similar magnitude to that reported after metformin therapy (3.3–3.9 mmol/L).20 Similarly, the changes in HbA1c reported after qigong training (0.8%–0.94%)16 were close to those reported in metformin trials (1%–2%).20,21

The main problem with interpretation of the data in the studies reviewed here is that only one of the studies included a control group. Other limitations relate to the relatively short duration of most of the trials and the inconsistent or poorly described frequency and intensity of participation in qigong. In addition, concurrent pharmacologic intervention among study participants was variable or not reported, making it impossible to ascertain the effects of medication and changes in medication on reported outcomes. Only one study reported commencing the intervention of qigong after pharmacologic stabilization of blood-glucose levels,9 making it difficult to estimate the isolated effect of qigong on blood glucose after adjustment for the effects of medication. There is therefore a clear need for more well-designed studies to assess the effect of qigong on diabetes management, and to evaluate the impact of qigong interventions among patients with prediabetes.

Qigong has particular characteristics that are likely to be important for diabetes control and prevention. For example, qigong involves the activation of large muscle groups, which is likely to enhance glucose disposal, and it has a strong focus on relaxation and controlled breathing, which may have important effects in terms of stress reduction. The combination of both muscle movement and stress-reduction properties points to the potential of qigong for diabetes prevention and management, particularly in light of strong evidence of associations between diabetes and both physical activity22–25 and stress.26 This low-intensity, low-impact activity may be particularly useful for managing diabetes among older adults or those with overweight or obesity, since these people may find more conventional forms of Western exercise more challenging, and may be fearful of injury and other adverse health consequences of more vigorous exercise.27 Qigong may also offer an alternative form of exercise for older people who prefer not to exercise in gymnasiums and who are therefore unlikely to participate in the kind of resistance-training programs that have previously shown promise in the management of type 2 diabetes.28

Although the results reported here suggest that qigong training may have a positive effect on diabetes control, more rigorous studies are required to ascertain its effectiveness in the management of diabetes and its potential for preventing onset of the disease. Such studies should be designed to include control groups and ensure the representativeness of study-group samples by recruiting participants from community-based sources. Future studies should also attempt to control or at least assess medication effects and attempt to report the isolated effects of qigong training on indicators of diabetes management after controlling for other concurrent treatment effects. Given the lack of rigorous evidence for the effectiveness of qigong training on diabetes management, the full range of relevant indicators of diabetes management should be assessed, and blood should be taken after a sufficient interval since the last previous training period so as to remove the acute effects of training on measures of blood glucose and insulin. Furthermore, the quality of reporting of studies of the effect of qigong on diabetes management in the published literature requires improvement, including more explicit description of the type of training used (static versus dynamic, duration, frequency, predominant movements, etc.), to allow replication and comparability of effects between studies.
CONCLUSIONS

If the efficacy of qigong in the prevention and/or management of diabetes can be more clearly demonstrated, assessment of the potential for more widespread implementation of qigong programs in Western countries, and the acceptability of these programs, will have to be considered. However, the findings presented here provide grounds for cautious optimism in considering the potential role of qigong for diabetes management.

ACKNOWLEDGMENTS

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REFERENCES


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