



Effects of Ba Duan Jin Qigong on Balance and Fitness Ability in Older Adults with Type 2 Diabetes Mellitus

Chun Mei Xiao^{1*}, Yong Chang Zhuang² and Yong Kang³

¹Department of Health Promotion and Physical Education, Beijing Institute of Graphic Communication, Beijing 102600, China

²Department of Wushu Beijing Sport University, Beijing 100084, China

³Department of Health Promotion and Physical Education, Beijing University of Chemical Technology, Beijing 100029, China

Abstract

Objectives: The purpose of the present study is to examine the effects of Ba Duan Jin (BDJ) on balance and fitness ability in older adults with Type 2 diabetes mellitus.

Design: Randomized, controlled trial of 24 weeks duration.

Setting: Twenty congregate living facilities in the Beijing area of China.

Participants: Ninety-four older adults with type 2 diabetes of 54 women and 40 men aged 60 to 70.

Interventions: BDJ group trained Ba duan jin was 6 months, with five 1-2 h sessions per week, and CG received no intervention.

Measurements: Demographics, Static and dynamic balance (Berg Balance Scale), dynamic balance (Timed Up-and-Go), fitness test (Arm Curls, 30-Second Chair Stand, Back Scratch, Chair Sit-and-Reach, 8-foot Timed Up-and-Go, 6-Minute Walk Test), Bone Mineral Density (BDM) and glycosylated hemoglobin (HbA1c) were measured for each subject at baseline and 6 months later.

Results: After 6 months of Ba duan jin exercise, older adults with type 2 diabetes significantly increased in Berg Balance Scale ($P=0.015$), arm curls right ($P=0.039$), 30-second chair stand ($P=0.041$), back scratch-right ($P=0.049$), right chair sit-and-reach ($P=0.008$), left chair sit-and-reach ($P=0.009$), 6-min walk test ($P=0.045$), Timed Up-and-Go ($P=0.021$), HbA1c ($P=0.034$) of the BDJG. The CG performance remained at the pretest level.

Conclusion: The results of this study recommend that Ba duan jin exercise may have the potential to improve the balance performance and body flexibility, muscle strength, aerobic endurance, and decrease HbA1c of older people with type 2 diabetic.

Keywords: Diabetes mellitus; Glucose metabolism; Chronic diseases; Bone density

Introduction

The risk of injurious falls and physical disability is two to three times as great in older adults with diabetes mellitus as in those without [1]. Regular physical activity may prevent or delay diabetes and its complications [2]. Ba duan jin is a qigong which has more than one thousand years of history in China, consists of the eight movements [3]. Long-term Ba duan jin Qigong training can significantly improve the physical function of patients with chronic diseases and improve their blood glucose, lipids, blood pressure, cardiovascular events, bone density, balance and quality of life [4]. The purpose of this study was to investigate whether Ba duan jin Qigong exercise may be an appropriate treatment strategy to improve balance control, fitness ability and decrease the HbA1c in Older Adults with Type 2 Diabetes Mellitus.

Methods

Ninety-four older adults with type 2 diabetes of 54 women and 40 men (aged 66.3 ± 7.5 , 60-70 years), were randomized into two groups, 47 participants of the Ba duan jin Qigong Group (BQG) and 47 non-regular participating older adults with diabetes of the Control Group (CG) in this study to serve as control. Subjects provided written informed consent to participate in the study as approved by the ethics review committee of the Beijing Sport University. The BQG received treatment sessions four times a week for 6-month. Each session lasted approximately 60-min training (warming-up 10 min, Ba duan jin Qigong (Figure 1) exercise 45 min, the cool down exercise 5 min). The CG have never practiced Ba duan jin and received no intervention. Berg Balance Scale (BBS), 8-foot Timed Up-and-Go (TUG), 6-min Walk (6 MW),

Arm Curls (AC), 30-Second Chair Stand (30-SCS), Back Scratch (BS), Chair Sit-and-Reach (CSR) glycosylated hemoglobin (HbA1c) (Table 1) were measured in each subject at baseline and 6 months later.

Results

After 6 months, BBS, AC right, 30-SCS, BS-right, right CSR, left CSR and 6MW significant increased from normal, TUG ($P=0.021$) and HbA1c ($P=0.034$) significant decreased from normal in the BQG. The CG performance remained at the pretest level (Table 2).

Discussion

The outcomes of the current study demonstrated that Ba duan jin Qigong significant improvements in BBS and decrease in TUG. These findings showed a trend toward improvement balance performance in MD populations following therapy with the Ba duan jin Qigong. Previously, other measures of postural instability have been shown to improve as a result of the Ba duan jin Qigong intervention [4,6-8].

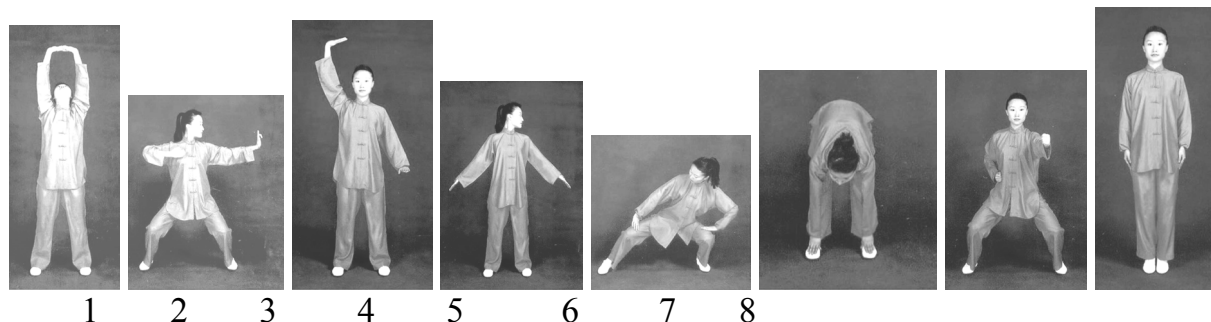
***Corresponding author:** Chun Mei Xiao, Department of Health Promotion and Physical Education Beijing Institute of Graphic Communication, Beijing 102600, China, Tel: +86 13439562608; E-mail: tiyibu@yahoo.com

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The Health Qigong Protocol—Baduanjin and the recommended adaptations for patients with Type 2 Diabetes Mellitus



Adaptations for patients with DM

- 1) Accurate requires that the postures and approaches fit the requirements and regulations. The physical conditions of the practitioners, especially aged and inform ones, should be taken into account when gauging the intensity of the routines.
- 2) Breathing method: Natural breathing is recommended for beginners. Deep breathing can be adopted after mastering the basic points, when coordination between movements and breathing is required.
- 3) Movements should be performed at a range within the one's comfort zone, but a little sense of stretching is required,
- 4) Allows pauses for rest, whenever necessary, and,
- 5) Allows choices of routines that the patients feel competent to practice at the start and gradually upgrade to the full set according to individual progress.

Figure 1: The Health Qigong Baduanjin.

Variables	CG (n = 37)			BQG (n = 39)			Between group p
	Pre-Test	Post-Test	p	Pre-Test	Post-Test	p	
AC right arm, n	22.47(6.68)	21.68(7.42)	0.185	22.27(8.13)	26.72(3.25)	0.046	0.037
AC left arm, n	21.95(8.17)	20.53(6.52)	0.134	22.0(6.84)	23.89(3.92)	0.122	0.065
30-SCS	12.03(4.36)	11.45(3.96)	0.131	11.87(7.15)	14.16(3.27)	0.045	0.040
BS right, cm	-22.48(15.43)	-23.75(12.57)	0.195	-22.56(13.71)	-18.13(10.62)	0.041	0.047
BS left, cm	-26.89(10.21)	-27.34(11.57)	0.254	-26.72(13.47)	-24.18(12.71)	0.094	0.082
CSR right, cm	-6.69(7.83)	-6.88(5.79)	0.151	-6.83(8.85)	-3.04(4.17)	0.008	0.007
CSR left, cm	-6.82(9.56)	-6.97(5.74)	0.212	-6.67(7.32)	-3.29(4.08)	0.009	0.008
TUG, seconds	7.79(0.93)	7.83(4.52)	0.571	7.80(2.78)	6.79(2.36)	0.023	0.020
6-MWT, meters	413.89(85.46)	408.95(79.28)	0.391	414.56(117.49)	457.38(87.51)	0.044	0.040
BBS	41.97(6.43)	41.50(10.63)	0.148	41.85(8.47)	47.73(5.48)	0.013	0.012
HbA1c	7.42(1.37)	7.53(1.25)	0.317	7.45(2.48)	6.59(1.46)	0.030	0.032

Table 1: Comparison of balance and functional fitness variables between BQG, CG after 6-month interventions. Data are not transformed. There were 18 dropouts: 8 (17.02%) in the Ba duan jin group and 10 (21.28%) in the control group. Median (Range) is presented for each outcome measure; statistically significant differences are indicated in bold ($p < 0.025$); Within group differences calculated with Wilcoxon Signed Rank; Between group differences in change scores calculated with Mann-Whitney U; CG: Control group; BQG: Baduanjin Qigong group; AC: Arm Curls in 30 s, Men used a 5-pound (2.27 kg) weight, and women used a 3-pound (1.36 kg) weight. The number of full arm curls was recorded in 30 s. 30-SCS: 30-Second Chair Stand; BS: Back Scratch; CSR: Chair Sit-and-Reach; TUG: 8-foot Timed Up and Go Test; 6MWT: Six-Minute Walk Test; BBS: Berg Balance Scale; HbA1c: Glycosylated hemoglobin.

Parameters	Clinical assessment methods
Berg Balance Scale	BBS is a 14-item scale. Each item or task is related to performance which is scored on an ordinal scale from 0 (unable to perform the task) to 4 (able to perform the task independently), with a total possible score of 56 (Berg et al., 1992). In order to determine fall risk, the scores are then compared to a predetermined range where scores from 0-20 indicates a high fall risk, 21-40 indicates a medium fall risk, 41-56 indicates a low fall risk.
Arm curls in 30 s,	This test was used to assess the participants' upper body strength. The test was performed in a seated position, with the chair firmly placed against the wall. The participants were instructed to start with the right arm and to complete as many arm curls as possible in 30 s. After a 1-min rest period, the test was repeated with the left arm. Men used a 5-pound (2.27 kg) weight, and women used a 3-pound (1.36 kg) weight. The number of full arm curls was recorded and used for the analysis.
30 s chair stand	The 30-Second Chair Stand (30-SCS) is a test used to assess overall lower body muscle strength and endurance. It involves counting the number of times within a 30 s time period that a person can come to a full stand from a seated position with arms folded across their chest. A higher number of repetitions results in a better score.
Back scratch	The participants were instructed to reach with one hand over the shoulder and with the other hand up the middle of the back from a standing posture. After a warm-up trial for each arm, the participants started with the right arm reaching over the shoulder, followed by the left arm reaching over the shoulder. The distance between the middle fingers was recorded as a negative (-) value if the fingers did not touch and as a positive (+) value if the fingers reached past one another (overlapped).
Chair sit-and-reach	The test begins with the participant sitting on the edge of a chair. They are asked to extend one leg straight out in front of their hip with their foot flexed leaving their heel resting on the ground. They are then asked to reach forward with their arms outstretched and overlapping, and middle fingers even, reaching as far forward as possible toward or past the toes of the straightened leg. Their score in inches is measured by the distance (+ or -) from the top of their toe being the point of zero. The more positive the score is, the better the results.
Timed Up-and-Go	The participants were seated all the way back in a stable chair of standard height (0.44 m) without armrests placed firmly against the wall. At the tester's "Go," the participants stood up, walked eight feet (marked by a small orange cone), turned around, and returned to their seated position. The time from the initial seated position to the final seated position was recorded. Each participant completed two trials, and the average of the two trials was calculated and used for the analysis.
6-min walk test	The 6-Minute Walk (6 MW) test is used to measure aerobic endurance. It involves the number of yards/meters that can be walked in 6 min around a 50-yard (45.7 m) course.
Glycosylated hemoglobin	The assessments performed by nurses, occupational therapists.

Table 2: The measured parameters clinical assessment methods.

In our present investigation, data analysis indicated that the participants' right and left lower body flexibility right and left Chair Sit-and-Reach improved significantly in the BQG compared to the CG after a 6-month intervention.

This study has shown a correlation between the use of Ba duan jin qigong exercise and improvement in balance, body flexibility and glucose metabolism of older adults with DM. In accordance with our findings, It has been proved that practice of Ba Duan Jin improves the physical function, limb strength, and flexibility of the joints, and fortifies the nerves, and improve glucose and lipid parameters [5,9-10].

Comparison of results from the current study with those previously reported shows the Ba duan jin qigong exercise may have the potential to improve the balance performance, body flexibility and glucose of older adults with DM. These findings can contribute to the future planning of community-based exercise programs of older adults with type 2 diabetes.

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