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An Assessment of Tai Chi Exercise on Cognitive Ability in Older Adults

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Abstract

The purpose of this study was to evaluate the effects of Tai Chi exercise on cognitive performance of community-dwelling elderly in Vinh city, Vietnam. It is a controlled trial. One hundred subjected were recruited. Subjects were divided randomly into two groups. Tai Chi group was assigned 6-months Tai Chi training. Control group was instructed to maintain their routine daily activities. Participants in Tai Chi group reported significant improvement cognitive ability, part A with $F(1, 68) = 75.36$, $p < .001$, and in part B with $F(1, 68)= 172.83$, $p < .001$ in comparison with Control group. Tai Chi is beneficial to improve cognitive performance of the elderly.

Keywords: Cognitive ability, Tai Chi, older adults

Introduction

With an increasingly aged population, both in Vietnam and internationally, cognitive impairment is a major health and social issue. Cognitive decline is among the most feared aspects of growing old. It is also the most costly, in terms of the financial, personal and social burdens (Deary, et al., 2009). Not all cognitive domains are affected equally by age, and not all cognitive processes show age-related decline. Physical activity is one of factors that might improve cognitive function of aging population. In a review of Angevaren (Angevaren, Aufdemkampe, Verhaar, Aleman, & Vanhees, 2008) concluded that aerobic physical activities which improve cardio-respiratory fitness are beneficial for cognitive function in healthy older adults, with effects observed for motor function, cognitive speed, auditory and visual attention. However, the majority of comparisons yielded no significant results. Tai Chi consists of series of gently physical activities with element and meditation, body awareness, imagery, and attention to breathing (Yeh, 2008). Furthermore, Tai Chi is a low intensity exercise that conducts aerobic benefit, effective for improving health fitness (Lan, Lai, Chen, & Wong, 1998) Tai Chi also appears to have physiological and psychological benefits and to be safe and effective in promoting balance control, flexibility, and cardiovascular fitness (Wang, Collet, & Lau, 2004) To our knowledge, there have been a few studies research on effects of Tai Chi cognitive performance of older people living in community.

Meterials and Method

- Participants

Ninety participants were recruited at age 60 to 79 (68.9 ± 5.1) from Vinh city to undertake a Tai Chi program. A 6-month Tai Chi training included pre-training, post-training and follow-up (follow-up used only for Tai Chi group). Inclusion criteria of both groups included the subjects being able to finish the Mini Mental State Examination (MMSE) with score greater than 24, have no experience in Tai Chi. Exclusion criteria included subjects who contact with serious disease such as: symptomatic coronary insufficiency, angina, arrhythmia, orthostatic hypotension, dementia problem.

- Intervention

One hundred subjects were recruited. Ten subjects did not the meet exclusion criteria MMSE (>24). Subjects were divided randomly into two groups, Tai Chi group and Control group. The subjects were expected to consent and volunteer. Participants in Tai Chi group (*n=45, mean (M) age = 69.3 years, standard deviation (SD) = 5.1)* were assigned 6-months Tai Chi training. Participants in the control group *(n=45, M age = 68.5, SD = 4.8)* were instructed to maintain their routine daily activities and not to begin any new exercise programs.

Participants in the Tai Chi group attended a 60-minute Tai Chi practice session twice a week for 6 months. The session consisted of a 15-minute warm-up and a 15-minute cool-down period. Participants in Control group were instructed to maintain their routine daily activities.

- The main outcome measure

Trail Making Test: TMT is primarily a test of motor speed and visual attention. In TMT, part A, the subject's task is to quickly draw the lines on a page connecting 25 consecutive numbers. In part B, the subjects must draw the lines alternating between number and letter. Both parts of the Trail Making Test consist of 25 circles distributed over a sheet of paper (as

described in Corrigan & Hinleldey (Corrigan & Hinleldey, 1987); Gaudino et al (Gaudino, Geisler, & Squires, 1995); Reitan (Reitan, 1958).

- Statistical analyses

Analysis of variance (ANOVA) was used to analyze the differences dependent variables of tests. General linear repeated measures were used to identify interaction between types of intervention and test-time; and main effect within-subject. A $p < .05$ was considered to be statistically significant.

Findings

Comparison of cognitive performance between Tai Chi and Control groups at Baseline

Table 1. One - way ANOVA between Tai Chi and Control groups at Baseline

Dependent variables		Tai Chi (n=45)	Control (n=45)	F (1, 88)	Significance*
		Mean ± SD	Mean ± SD		
TMT	Part A	46.41 ± 6.78	46.07 ± 5.33	0.081	0.777
	Part B	116.06 ± 6.74	118.25 ± 7.82	2.152	0.146

*Note: * Determined by ANOVA; TMT = Trail Making Test.*

Results in table 1 show that there are no significant differences in independent variables between Tai Chi and Control groups at Baseline ($p > 0.05$).

Comparison of cognitive performance between Tai Chi and Control groups at Endtest

Table 2. One - way ANOVA between Tai Chi and Control groups at Endtest

Dependent variables		Tai Chi (n=36)	Control (n=32)	F (1, 68)	Significance*
		Mean ± SD	Mean ± SD		
TMT	Part A	35.07 ± 4.32	46.21 ± 4.55	75.36	0.000
	Part B	103.05 ± 5.06	118.32 ± 6.36	172.83	0.000

*Note: * Determined by ANOVA; TMT = Trail Making Test.*

Results in table 2 revealed that there are significant differences in independent variables between Tai Chi and Control groups at Endtest. Result from cognitive performance can be observed from TMT part A with $F(1, 68) = 75.36$, $p < 0.001$; TMT part B with $F(1, 68) = 172.83$ $p < 0.001$, respectively.

Comparison of the results from three periods of tests between Tai Chi and Control groups

Table 3.General linear model-repeated measures of variables

Measurement		MS	df	F	Significance	(η)
TMT	Part A	764.37	1.449, 142	208.87§	0.000	0.746
		613.68	1.449, 142	171.74§§	0.000	0.708
	Part B	1686.37	1.357, 142	435.65§	0.000	0.860
		1601.50	1.357, 142	413.73§§	0.000	0.854

*Note: §.Testtime; §§.Testtime*group; η = Eta squared; TMT = Trail Making Test*

There were significant interactions in cognitive performance between two groups and times of tests. It can be observed from results shown in table 3 ($p < 0.001$).

Discussion and Conclusion

In this study, we examined the effects of 24 form Tai Chi exercise in six months on cognitive performance of older people living in dwelling community. On the basic of study it may be concluded that 24-week Tai Chi training has good impact on cognitive performance of the elderly in dwelling community in Vietnam. The main findings of this study were that older adults benefited from Tai Chi exercise for cognitive executive function in comparison with their counterpart of Control group.

It has been documented in previous studies that Tai Chi could have better scores in the sit and reach test and total body rotation (Hong, Li, & Robinson, 2000), reduce fall (Choi, Moon, & Song, 2005) which showed that a 12-week Tai Chi exercise program can safely improve physical strength and reduce fall-prone older adults in residential care facilities, and blood pressure (Ko, Tsang, & Chan, 2006; Tsai, et al., 2003). Results of our study is resistant with the studies stated that Tai Chi could improve balance ability of older people,(Fong & Ng, 2006; Hackney & Earhart, 2008; Hain, Fuller, Weil, & Kotsias, 1999) sleep quality (Li, et al., 2004) which concluded that through a 6-month Tai Chi program, participants with moderate sleep complaints can be improved in self-rated sleep quality. Previous finding (Matthews & Williams, 2008) also suggested that after ten week Tai Chi program in older adult using a pre-to-post test design, cognitive executive function was improved. Tai Chi is a traditional Chinese aerobic exercise. Its benefits are to improve balance, flexibility, muscle strength, neuromuscular reaction and endurance in elderly individuals (Lan, Lai, Chen, & Wong, 2000; Taylor, et al., 2004; Xu, Li, & Hong, 2005). Tai Chi is also suggested to serve as a useful non-pharmacological approach to sleep problems in older adults (Li, et al., 2004) and this is a low-technology exercise that can be easily carried out in variety of communities. Furthermore, Tai Chi is a low-cost exercise (Li, et al., 2001) and it can be practiced indoor or outdoor.

With the low rate of participants dropped out in this study, it is evident that relatively high rate of participants were likely to engage in Tai Chi training. In this 24-week randomized controlled trial study, Tai Chi is beneficial to improve cognitive performance of older people in dwelling community.

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