P-0464 – Effects of Tai Chi on physical and psychosocial outcomes among T2DM patients: a systematic review

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Background

The high prevalence and various complications of diabetes cast great burdens to patients, their families and the society [1]. Physical activity is an effective approach for type 2 diabetes (T2DM) patients to gain optimal control over the disease [2].

In recent years, Tai Chi is gaining popularity in DM management. Several reviews on the effectiveness of Tai Chi for T2DM patients were identified [3-5]. However, the findings of these reviews were not consistent. Besides, these reviews were conducted several years ago. With the rapid updates in this field, the findings may be out-of-date.

Objective

To synthesize and present the best available evidence on the effects of Tai Chi on physical and psychosocial outcomes among T2DM patients.

Methods

- This systematical review was conducted in accordance with the PRISMA statements [6].
- Ten English or Chinese electronic databases, including MEDLINE, EMBASE, PsycINFO, CINAHL Complete, AMED and Cochrane Central Register of Controlled Trials, CNKI, Wan Fang, SinoMed and Airiti Library, were search through their inceptions to December 2016.
- This systematic review considered all journal articles reporting randomized controlled trials (RCTs) or controlled clinical trials (CCTs) that investigated the effects of Ba-Duan-Jin on physical or psychosocial outcomes, including haemoglobin A, glycosylated (HbA1c), fasting blood glucose (FBG), blood pressure, depression and quality of life (QOL), among adult T2DM patients.
- Two independent reviewers selected studies according to the prespecified inclusion and exclusion criteria and appraised the risk of bias of the included studies. Discrepancies were solved by discussion or consulting to the third reviewer when consensus cannot be reached.

	Ta	ii Chi		Co	ontrol			Mean Difference		Mean Difference	
Study or Subgroup	Mean [mmol/L]	SD [mmol/L]	Total	Mean [mmol/L]	SD [mmol/L]	Total	Weight	IV, Random, 95% CI [mmol/L]	Year	IV, Random, 95% CI [mmol/L]	_
Wang & Cao 2003	-1.7	1.9	10	0.2	2	6	7.7%	-1.90 [-3.89, 0.09]	2003 -		
Orr et al. 2006	0.1	2.74	17	-0.2	2.51	20	9.6%	0.30 [-1.40, 2.00]	2006		
Wuetal. 2010	-2.09	1.91	20	0.22	1.82	20	15.2%	-2.31 [-3.47, -1.15]	2010		
Ahn & Song 2012	-0.71	2.26	20	0.66	1.46	19	14.8%	-1.37 [-2.56, -0.18]	2012		
Youngwanichsetha et al. 2013	-0.57	0.97	32	-0.11	0.91	32	26.2%	-0.46 [-0.92, 0.00]	2013		
Bao et al. 2016	-2.3	0.89	58	-1	1.35	49	26.5%	-1.30 [-1.74, -0.86]	2016		
Total (95% CI)			157			146	100.0%	-1.14 [-1.78, -0.50]		•	
Heterogeneity: Tau ² = 0.35; Chi ²	= 15.37, df = 5 (P =	= 0.009); I ² = 63	7%								1
Test for overall effect: Z = 3.49 (P	= 0.0005)								-4	Favours [Tai Chi] Favours [control]	

Figure 2 Forest plot of studies on Ba-Duan-Jin reporting FBG

- ✤ A pooled analysis of the three studies measured blood pressure indicated a favorable but non-significant effect on decreasing both the systolic blood pressure and the diastolic blood pressure.
- The effects of Tai Chi on QOL were investigated in five studies, the results showed that Tai Chi is effective in improving the physical domain of QOL among T2DM patients (MD=5.92, 95% CI: 0.68 to 11.16, p < 0.05; Figure 3). The pooled analysis demonstrated a favorable but non-significant effect in improving the mental domain of QOL. However, the effect became statistically significant (MD=6.54, 95% CI: 0.77 to 12.31, p < 0.05) after removing the study that recruited participants with good glycemic control (Figure 4).</p>

Tai Chi				C	ontrol			Mean Difference		Mean Difference		
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% Cl	Year	IV, Random, 95% Cl		
Tsang et al. 2007	1.6	23.6	17	-2	23.6	20	9.2%	3.60 [-11.66, 18.86]	2007			
Lam et al. 2008	9.43	27.14	24	-3.1	26.56	22	8.9%	12.53 [-3.00, 28.06]	2008			
Wang et al. 2009	10.16	15.06	34	0.66	15.21	30	22.5%	9.50 [2.07, 16.93]	2009			
Wu et al. 2010	9.7	9.1	20	1.1	10.2	20	26.8%	8.60 [2.61, 14.59]	2010	│ ── ●──		
Ahn & Song 2012	0.83	7.31	20	0.74	6.08	19	32.6%	0.09 [-4.12, 4.30]	2012			
Total (95% Cl) Heterogeneity: Tau ^z =	= 17.34; C	Chi² = 8.	115 .78, df =	= 4 (P =	0.07); l ^a	111 ²= 54%	100.0%	5.92 [0.68, 11.16]	_			
Test for overall effect:	Z = 2.22	(P = 0.)	03)							Favours [control] Favours [Tai Chi]		
Figure 3 H	Fores	st pl	ot c	of st	udie	es oi	n Tai	Chi report	ing Q	QOL – physical domair		
Figure 3 I	Fores	st pl	Ot C	of st		es oi	n Tai	Chi report	ing (OL – physical domair		
Figure 3 I	Fores	st pl	Ot C	of st Mean	udie	2S O1	n Tai <u>Weight</u>	Chi report	ing (OL – physical domain Mean Difference IV, Random, 95% Cl		
Figure 3 F	Fores T Mean	st pl	Ot C	of st <u>Mean</u> 4	introl	Total	n Tai <u>Weight</u> 0.0%	Chi report Mean Difference N. Random, 95% CI -3.90 [-13.37, 5.57] 3.68 [-5.42, 12.78]	ing (<u>Year</u> 2007	OL – physical domain Mean Difference IV, Random, 95% CI		
Figure 3 H Study or Subgroup Tsang et al. 2007 Lam et al. 2008 Vang et al. 2009	Fores T <u>Mean</u> 0.1 2.25 4.07	st pl	Ot C	of st 0 <u>Mean</u> 4 -1.43 1.41	udie control 5D 14.1 11.02 14.82	Total 20 22 30	n Tai <u>Weight</u> 0.0% 20.4% 73.8%	Chi report Mean Difference <u>N. Random, 95% Cl</u> -3.90 [-13.37, 5.57] 3.68 [-5.42, 12.78] 2.66 [-5.08, 10.40]	<u>Year</u> 2007 2008 2009	OL – physical domain Mean Difference IV. Random, 95% CI		
Figure 3 F Study or Subgroup Tsang et al. 2007 Lam et al. 2008 Wang et al. 2009 Wu et al. 2010	Fores T <u>Mean</u> 0.1 2.25 4.07 10.9	st pl	OT C	of st c <u>Mean</u> 4 -1.43 1.41 -2.2	udie control SD 14.1 11.02 14.82 6.7	Total 20 22 30 20	n Tai <u>Weight</u> 0.0% 20.4% 23.8% 31.8%	Mean Difference M. Random, 95% CI -3.90 [-13.37, 5.57] 3.68 [-5.42, 12.78] 2.66 [-5.08, 10.40] 1310 [815 18.06]	<u>Year</u> 2007 2008 2009 2010	OL – physical domain Mean Difference IV, Random, 95% CI		
Figure 3 F Study or Subgroup Tsang et al. 2007 Lam et al. 2008 Wang et al. 2010 Wu et al. 2010 Ahn & Song 2012	Fores T <u>Mean</u> 0.1 2.25 4.07 10.9 1.93	st pl ai Chi sp 15.1 19.63 16.76 9.1 13.5	OT C <u>Total</u> 17 24 34 20 20	0f st Mean 4 -1.43 1.41 -2.2 -2.2	control SD 14.1 11.02 14.82 6.7 10.77	Total 20 22 30 20 19	n Tai <u>Weight</u> 0.0% 20.4% 23.8% 31.8% 24.0%	Chi report Mean Difference N. Random, 95% Cl -3.90 [-13.37, 5.57] 3.68 [-5.42, 12.78] 2.66 [-5.08, 10.40] 13.10 [8.15, 18.05] 4.13 [-3.52, 11.78]	Year 2007 2008 2009 2010 2012	OL – physical domair		
Figure 3 F Study or Subgroup Tsang et al. 2007 Lam et al. 2008 Wang et al. 2009 Wu et al. 2010 Ahn & Song 2012 Fotal (95% CI)	Fores Mean 0.1 2.25 4.07 10.9 1.93	st pl ai Chi 5D 15.1 19.63 16.76 9.1 13.5	OT C <u>Total</u> 17 24 34 20 20 98	Mean 4 -1.43 1.41 -2.2 -2.2	control SD 14.1 11.02 14.82 6.7 10.77	Total 20 22 30 20 19 91	n Tai 0.0% 20.4% 23.8% 31.8% 24.0% 100.0%	Mean Difference N, Random, 95% CI -3.90 [-13.37, 6.57] 3.68 [-6.42, 12.78] 2.66 [-6.08, 10.40] 13.10 [8.15, 18.05] 4.13 [-3.52, 11.78] 6.54 [0.77, 12.31]	Year 2007 2008 2009 2010 2012	OL – physical domair		
Figure 3 F Study or Subgroup Tsang et al. 2007 Lam et al. 2008 Wang et al. 2009 Wu et al. 2010 Ahn & Song 2012 Total (95% CI) Heterogeneity: Tau ² =	Fores T Mean 0.1 2.25 4.07 10.9 1.93 20.90; 0	ai Chi sb 15.1 19.63 16.76 9.1 13.5	OT C <u>Total</u> 17 24 34 20 20 98 75. df=	Mean 4 -1.43 1.41 -2.2 -2.2 = 3 (P =	control SD 14.1 11.02 14.82 6.7 10.77	Total 20 22 30 20 19 91 2 = 61%	n Tai 0.0% 20.4% 23.8% 31.8% 24.0%	Mean Difference <u>N, Random, 95% Cl</u> -3.90 [-13.37, 5.57] 3.68 [-5.42, 12.78] 2.66 [-5.08, 10.40] 13.10 [8.15, 18.05] 4.13 [-3.52, 11.78] 6.54 [0.77, 12.31]	Year 2007 2008 2009 2010 2012	OL – physical domain		

mental domain

None of the included studies measured depression or the social domain of QOL.



When feasible, data were statistically pooled in a meta-analysis. Otherwise, narrative summaries were utilized.

Results

- Eight studies (446 participants) were included in this systematic review. In general, the included studies were subject to substantial risk of bias. Seven studies utilized usual care control while the other one used sham exercise control.
- HbA1c was measured in six studies and the pooled analysis showed a favorable but non-significant effect on reducing HbA1c. However, after removing one study, of which the participants' average baseline HbA1c level was optimal (<7.0%), the sensitivity analysis showed a statistically significant effect (MD: -1.48%, 95% CI: -2.58% to -0.39%, p < 0.01; Figure 1).</p>

Study of Subarous	Ta Moon (VI	ii Chi	Tetal	Co Moon (%)	ntrol	Total	Moight	Mean Difference	Vear	Mean Difference
Study of Subgroup	wear 170	5U [70]	Total	wear 170	SU [70]	TULA	weight	IV, Ranuolli, 95% CI [%]	Teal	IV, Rahuolii, 95% Ci [%]
Tsang et al. 2008	-0.07	0.4	17	0.12	0.3	20	0.0%	-0.19 [-0.42, 0.04]	2008	
Lam et al. 2008	-0.3	1.4	24	-0.2	1.5	20	18.8%	-0.10 [-0.96, 0.76]	2008	
Wu et al. 2010	-1.53	0.57	20	1.18	0.87	20	20.5%	-2.71 [-3.17, -2.25]	2010	
Ahn & Song 2012	-0.43	0.57	20	0.3	0.87	19	20.5%	-0.73 [-1.19, -0.27]	2012	
Youngwanichsetha et al. 2013	-1.07	1.63	32	-0.26	1.82	32	18.9%	-0.81 [-1.66, 0.04]	2013	
Bao et al. 2016	-2.96	0.42	58	-0.11	0.38	49	21.2%	-2.85 [-3.00, -2.70]	2016	•
Total (95% CI)			154			140	100.0%	-1.48 [-2.58, -0.39]		
Heterogeneity: Tau ² = 1.47: Chi ²	= 121.70. df	′= 4 (P <	0.0000)1): I ^z = 97%						Here I I I I I I I I I I I I I I I I I I
Tect for overall effect: 7 – 2.65 /P	- 0.008)	· .								-4 -2 0 2
reactor overall effect. Z = 2.00 (F	- 0.000)									Favours (Tai Chi) Favours (control)

Figure 1 Forest plot of sensitivity analysis of studies on Tai Chi reporting HbA1c

FBG was measured in six studies, the pooled analysis demonstrated a favorable effect on decreasing FBG (MD: -1.14 mmol/L, 95% CI: -1.78 to -0.50 mmol/L, p < 0.01; Figure 2).

Conclusions

- This systematic review showed that Tai Chi is effective in reducing HbA1c and FBG, and improving QOL among T2DM patients, especially those whose glycemic control is suboptimal.
- Further studies are worthwhile in order to draw conclusion on the effects of Tai Chi on blood pressure and depression.
- The findings of this systematic review should be interpreted with the consideration of the risks of bias in the included studies and the susceptibility of publication bias of the review itself.

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