

# Observation and Study on Intervention of Tai Chi Daoyin on Cardiovascular Related Diseases

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## ABSTRACT

Lack of physical exercise and harmful eating habits may lead to obesity and hypertension, elevated blood glucose and blood lipid. It is the main non communicable disease leading to early death, which is called the metabolic risk factor of cardiovascular disease. This study compared the effects of Tai Chi Daoyin and low-intensity walking on cardiovascular disease to explore the best exercise options for preventing and treating cardiovascular disease at the same intensity. We observed that patients with Tai Chi Daoyin exercise habits exercised at least three times a week, and that patients without Tai Chi Daoyin exercise habits only maintained their initial physical exercise habits and regular medication for 9 weeks. P value (Time\*Group) indicates that there is interaction between the two groups from baseline to 9 weeks. P values (Time\*Group) show that Tai Chi Daoyin group and control group have different changes at baseline and 9 weeks. The difference between the two groups at 9 weeks was significant than the baseline difference in TCHO, FPG, SBP, DBP, LDL-C, WBC (P Value <0.05), indicating that Tai Chi Daoyin is effective for treating cardiovascular disease. The difference between the two groups during 9 weeks was significant in Hypertension, Hyperglycemia, Hyperlipidemia and medication use (P Value ≤0.05). The results showed that Tai Chi Daoyin had clinically meaningful improvement in Hypertension, Hyperglycemia and Hyperlipidemia. The research results preliminarily proved that Tai Chi Daoyin can improve the physical condition of patients with cardiovascular diseases.

**Keywords:** Cardiovascular Disease, Tai Chi, Daoyin, metabolic risk factors, aerobic exercise.

## 1. INTRODUCTION

Cardiovascular disease is one of the major non communicable diseases, which leads to the reduction of patients' life span. Lack of physical activities and bad eating habits may lead to the increase of blood pressure, blood glucose, blood lipid and obesity. These are known as metabolic risk factors for cardiovascular disease [1]. 1.6 million people die each year from physical inactivity [2].

Metabolic changes in four metabolic risk factors increase the risk of non-communicable diseases, of which elevated blood pressure is the leading cause of global mortality (19% of deaths worldwide) [2]. Previous studies have shown that Tai Chi or Daoyin (also known as Qigong) can have beneficial effects on cardiovascular diseases such as hyperlipidemia, hyperglycemia, hypertension, and associated inflammation. A meta-analysis (2015) statistical review

of 4311 subjects from 60 articles classified Tai Chi or Daoyin as traditional Chinese exercise (TCE) and showed that traditional Chinese exercise (TCE) reduced patients' anxiety and depression and improved patients' quality of life. Improved the condition from both physical and mental dimensions [3].

The internal mechanism of Tai Chi or Daoyin prevention and treatment intervention in cardiovascular disease is still in the exploratory stage. Therefore, the basic exercise prescription components such as the form and amount of exercise of Tai Chi or Daoyin prevention and treatment intervention in cardiovascular disease need to be further verified.

Previous studies have focused on the medical effects of a single type of exercise in Tai Chi or Daoyin on cardiovascular diseases. They did not consider Tai Chi and Daoyin as a whole, and studied the therapeutic effects of their combination.

Tai Chi combined Daoyin, a combination of exercises, has not been carried out in previous related studies, and Get further mechanisms for TCE affecting cardiovascular diseases. In ancient China, not only medicines or acupuncture were used to treat diseases, but Daoyin was also an important means. There is a record about daoyin in *huangdi Neijing*, the earliest medical book in China.

In our study, we observed the effect of Tai Chi combined with Daoyin exercise on cardiovascular disease in 9 weeks. We observed that patients with Tai Chi Daoyin practice habits exercised at least three times a week, And that patients without Tai Chi Daoyin practice habits only maintained their initial physical exercise habits and regular medication. The data of blood pressure, blood sugar and blood lipid were collected to compare the physiological indexes of Tai Chi Daoyin exercise and NoTai Chi Daoyin exercise.

The patients we observed who had the habit of practicing Tai Chi Daoyin were members of the Tai Chi Association of Northwestern Polytechnical University. The protocol obtained the network informed consent and signature of all participants, and was approved by the Ethics Committee of the Northwestern Polytechnical University Hospital.

The experiment conforms to the protocol, all authors guarantee the completeness and accuracy of the data, If the article is published, the results in this article are published for the first time and have not been published before.

## 2. METHODS

Eligibility criteria include:

1) clinical diagnosis of cardiovascular diseases:

We observed 35 patients with cardiovascular disease and they were naturally divided into two groups. The disease states of 35 cardiovascular disease patients were distributed in stages 1 to 3. Stages 1 to 3 correspond to different stages of cardiovascular disease prevention, treatment, and rehabilitation. This is also the long-term consensus of the medical profession. Stage 1 means that the risk factors for cardiovascular disease have appeared, but the disease has not yet formed, and the disease is prevented before it occurs. Stage 2 refers to that cardiovascular disease has occurred and is in the chronic phase of treatment. At this time, the intervention is to treat the disease. Stage 3 refers to the cardiovascular disease that has been cured or is in a chronic recovery period to prevent recurrence.

2) Aged between 39 and 76.

3) No regular Tai Chi or Daoyin exercise refers to Tai Chi or guided exercise more than 3 times a week for 1 hour each time for at least the last 3 months.

Medication has been stable or not.

Exclusion criteria were

1) The severity of cardiovascular disease is not suitable for physical exercise, or there are other related diseases that are not suitable for exercise;

2) Pass a mini-test that is a basic screening test for mental health.

The combination of Tai Chi and Daoyin is based on the zang-fu theory of Traditional Chinese medicine. We observed 62 Style Tai Chi combined with Daoyin (Qigong) in the prevention and treatment of cardiovascular diseases in this study.

The study was carried out by Tai Chi, Daoyin professional staff and TCM professional doctors.

We observed that patients with Tai Chi Daoyin exercise habits exercised at least three times a week, And that patients without Tai Chi Daoyin exercise habits only maintained their initial physical exercise habits and regular medication for 9 weeks.

Results the changes of inflammatory immune indexes (leukocyte count) in blood routine and blood glucose, blood pressure, blood lipid and from baseline to the end of nine-week were statistically measured. Blood pressure: right brachial artery pressure was measured using a conventional cuff mercury sphygmomanometer, operated by an occupational nurse while subjects were seated. Before measurement, the subjects rested peacefully for more than 30 minutes. The average value of 3 measurements was taken and counted according to Criteria of WHO diagnostic for Hypertension.

The qualification screening was started according to the inclusion criteria, and there were a total of 85 volunteers. They are all residents of Xi'an, 53 of them qualified and met the admission criteria. Thirteen volunteers in this study dropped out due to time conflicts and other reasons.

The baseline Clinical Characteristics variables of the two groups of subjects are shown in Table 1. The attendance rate of the two groups of subjects is higher. The average attendance rate of the Tai Chi Daoyin group is 85%, in the interval 69% to 100%, while the average attendance rate of the control group is 86%, in the interval 71% to 100%. Table 1 shows no significant difference in any baseline biochemical parameters between the two groups.

**Table 1.** Subject's clinical characteristics variables Baseline(between groups).\*

Variable Value	Mean Change Differences (95% CI)†		P
	Tai Chi Daoyin (n=19)	Control (n=16)	
TCHO(mmol/L)‡	5.08±1.32	4.99±1.19	0.841
FPG(mmol/L)§	5.68±0.99	5.39±1.02	0.399
SBP(mmHg)¶	134.26±20.89	130.38±20.01	0.580
DBP(mmHg)¶	83.95±11.82	83.19±14.21	0.864
TG(mmol/L)¶	1.63±0.53	1.98±0.84	0.146
LDL-C(mmol/L)**	3.12±1.09	3.12±1.07	0.995
HDL-C(mmol/L)††	1.32±0.35	1.18±0.30	0.229
WBC(10 <sup>9</sup> /L)‡‡	6.05±1.54	6.22±1.50	0.748

\* Positive and negative values are expressed as mean ± SD. The P value indicates whether there are significant differences between groups.  
 † P values were calculated with post hoc test of one-way analysis of variance between the two groups at Baseline.  
 ‡ Total cholesterol(TCHO).  
 § Fasting plasma glucose(FPG).  
 ¶ Systolic blood pressure (SBP), diastolic blood pressure (DBP).  
 † Triglyceride(TG).  
 \*\* Low density lipoprotein cholesterol(LDL-C).  
 †† High-density lipoprotein cholesterol(HDL-C).  
 ‡‡ Leucocyte referred to as WBC (white blood cell).

**Statistical analysis**

The data are expressed as mean±SD, using p<0.05 threshold (two-tailed). And analyzed the statistical analysis software package using spss software version 22 (SPSS Corporation), Chicago, Illinois, USA.

Chi-square test is applied to categorical variables, and one-way analysis of variance is applied to continuous variables. Positive and negative values are expressed as mean ± SD. The P value indicates whether there are significant differences between groups. P values were calculated with Pearson chi-square test .

P values were calculated with repeatedmeasures analysis of variance and analysis of covariance. using p<0.05 threshold (two-tailed). indicated statistical significance.

**3. RESULTS**

P value(Time\*Group) indicates that There is interaction between the two groups from baseline to 9 weeks. P values(Time\*Group) show that Tai Chi Daoyin group and control group have different changes at baseline and 9 weeks.

The difference between the two groups at 9 weeks was significant than the baseline difference in TCHO, FPG, SBP, DBP, LDL-C, WBC(P Value <0.05), indicating that Tai Chi Daoyin is effective for treating cardiovascular disease.

Table 2 shows cardiovascular disease clinically meaningful improvement between Tai Chi Daoyin group and control group during 9 weeks. (Criteria of Significant improvement and Become better in Outcome Measures section.) P values were calculated with Pearson chi-square test .

The difference between the two groups during 9 weeks was significant in Hypertension, Hyperglycemia, Hyperlipidemia and medication use(P Value ≤0.05), The results showed that Tai Chi Daoyin had clinically meaningful improvement in Hypertension, Hyperglycemia and Hyperlipidemia.

In medication use, At 9 weeks, more exercisers had discontinued medication used to treat chronic disease in Tai Chi Daoyin group than in the control group. 6 patients in Tai Chi Daoyin group stopped taking the medicine(Significant improvement), 12 reduced the medicine(Become better) , and 1 did not change the medicine. In the control group, 1 stopped taking the medicine(Significant improvement), 3 reduced the medicine(Become better), and 12 did not change the medicine.

P values<0.001, The difference was significant, indicating that patients recovered better in Tai Chi Daoyin group.

Total effective percentage was 91.30% in Tai Chi Daoyin group. Total effective percentage was 73.07% in control group. Table 4 shows that Tai Chi Daoyin can significantly improve cardiovascular disease. No adverse events were noted during the study period.

**Table 2.** Cardiovascular Disease Clinically Meaningful Improvement between Tai Chi Daoyin Group and Control Group during 9 Weeks.\*

Disease Value† (Type)	Tai Chi Daoyin vs. Control		P
	(N= 19)	(N= 16)	
Hypertension(Cases)			0.03
No change	0	1	
Become better*	2	5	
Significant improvement* 6		1	
Hyperglycemia(Cases)			0.05
No change	0	0	
Become better*	2	6	

Significant improvement*	2	0
Hyperlipidemia(Cases)		0.002
No change	2	6
Become better*	2	7
Significant improvement*	7	0
Total Cases	23	26
Effective percentage(%)	91.30	73.07
Medication Use(Cases)		<0.001
Significant improvement*	6	1

\* P values were calculated with Pearson chi-square test .  
 According to the diagnostic criteria of the World Health Organization (WHO).  
 See Clinical treatment effect Criteria for Criteria of Significant improvement and Become better in Outcome Measures section.  
 † P values were calculated with Pearson chi-square test .

**4. DISCUSSION**

This study shows that Tai Chi Daoyin can reduce risk factors for cardiovascular disease. It is expected to be a non-drug therapy. Tai Chi Daoyin group has obvious effect on blood glucose, blood pressure, blood lipid and white blood cell. After 9 weeks of Tai Chi Daoyin exercise, the curative effect of cardiovascular diseases was observed. During the whole observation period, Tai Chi Daoyin training did not cause any adverse events. This shows that TaiChi Daoyin is safe and effective for patients with cardiovascular disease.

In the research of Tai Chi Daoyin in the treatment of chronic diseases, our research results are corroborated by previous studies of Tai Chi Daoyin. Including other research on the benefits of Tai Chi or Daoyin on the quality of life. More meta-analyses are also consistent with our findings. These meta-analyses support the benefits of Tai Chi or Daoyin physical exercise in the management of cardiovascular disease symptoms[4].

Tai Chi Daoyin can effectively prevent and cure the risk factors of cardiovascular diseases such as hyperglycemia, hyperlipidemia, hypertension and diabetes[5]. Its influence is holistic. Tai Chi Daoyin can improve the aerobic metabolism of patients with cardiovascular diseases[6] [7] [8].

With the improvement of aerobic metabolism in patients with cardiovascular diseases, inflammation reverses throughout the body. Inflammation is one of the causes of cardiovascular disease[9] [10], depression and cancer. Immunomodulation is the advantage of Tai Chi Daoyin. This regulation belongs to the overall regulation, and it often has a dual direction regulation function.

**5. CONCLUSION**

Conventional drugs and surgical treatment are exogenous treatment, which have obvious rejection and side effects, which brings anxiety and pain to the patients. Tai Chi Daoyin is endogenous therapy, which belongs to systemic aerobic exercise, and develops the potential of self healing of patients to cure diseases. Compared with conventional drugs and surgical treatment, rejection and side effects are extremely small. To help improve the state of depression and anxiety in patients with cardiovascular diseases.

Cardiovascular disease is a common and sometimes life-threatening disease. But as far as we know, there is no clinical study using the combination of Tai Chi and Daoyin according to the principle of TCM. Therefore, this study adds the treatment literature based on the principle of TCM to show that Tai Chi Daoyin can effectively treat Cardiovascular disease.

**AUTHORS' CONTRIBUTIONS**

Both authors contributed equally to this work.

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