

## Application of TCM Exercise Intervention in the Treatment of Balance Disorder of Parkinson's Disease

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### Abstract

**In this paper, by analyzing the literature on the treatment of Parkinson 's disease balance disorder by Chinese medicine exercise at home and abroad in the past five years, this paper summarizes the research progress of Chinese medicine exercise in the treatment of Parkinson 's disease balance disorder from the aspects of the clinical overall efficacy, physiological effect, sociological effect of Chinese medicine exercise intervention on Parkinson 's gait disorder and the comparison of the effects of various Chinese medicine exercises and other conventional treatments. Literature review shows that traditional Chinese medicine exercise can effectively alleviate the symptoms of patients with Parkinson 's disease gait balance disorder, improve their movement posture, and reduce the occurrence of adverse events such as falls. The effect is more satisfactory than that of western medicine alone. And traditional Chinese medicine exercise has the advantages of non-invasive, simple and easy to learn, no equipment, no place limit, compared to some western medicine exercise compliance better. It provides a basis for selecting treatment options for patients with Parkinson 's balance disorder.**

### Keywords

**Parkinson 's disease; Balance disorder; Chinese medicine sports.**

### 1. Introduction

Parkinson's disease (PD) is the second most progressive neurodegenerative disease characterized by relative focal degeneration of midbrain dopamine (mesDA) neurons[1]. Parkinson's balance disorder is a clinical manifestation of reduced voluntary movement and slow movement during the progression of Parkinson's disease. According to statistics, the number of Parkinson's disease patients in China exceeds 2 million, and the incidence rate is on the rise. Parkinson's balance disorder has increased the frequency of falls in patients, which seriously affects the physical and mental health and quality of life of Chinese citizens[2]. At present, the main measures to control Parkinson's symptoms are still western medicine treatment, but due to the long time of drug treatment, high economic pressure, drug side effects and other factors have become the most difficult problems in the treatment of the disease. Therefore, the treatment of Parkinson's disease urgently needs easy, economical and effective alternative or auxiliary means.

So far, many studies have shown that TCM exercise can effectively relieve the symptoms of Parkinson's disease[3]As early as 24 years ago, Yu Xuhong et al. published a study that TCM exercise-assisted drug therapy could further improve Parkinson's motor symptoms[4]. tillIn 2006, the study of TCM movement and human health thought began to rise, which proved that walking, guiding, walking, spitting and meditation can also treat diseases. Since then, TCM movement has been more and more widely concerned by researchers[5]. Under the guidance

of basic theories of TCM, such as holistic view, constant movement view and dialectical view, TCM movement has become an effective means to prevent and treat diseases and promote the rehabilitation of diseases. In the treatment of Parkinson's disease, patients of different ages and severity can benefit from TCM exercise, and there is no significant difference with the effect of drug treatment to alleviate Parkinson's disease[6].

At present, however, the theoretical and practical research of TCM exercise intervention in Parkinson's disease has not yet attracted the attention of Chinese researchers. This paper reviews the results of recent 5 years to provide reference for TCM exercise intervention in Parkinson's balance disorder.

## **2. Effect of TCM exercise intervention in Parkinson's balance disorder**

### **2.1. Overall clinical efficacy of TCM exercise intervention in Parkinson's balance disorder**

Many studies have shown that TCM exercise can not only effectively improve the balance ability of Parkinson's patients, improve their movement and gait function, but also improve their quality of life, improve social cognition and regulate disease psychology, so the overall clinical effect is considerable. Liu Baoguo[7], Xiao, C.[8] Through the Berg balance scale (BBS) to evaluate the balance ability of Parkinson's patients, they confirmed that TCM exercise significantly improved the ability of Parkinson's balance. Wang Zhen[9], Zhang Shiya[10] In a study evaluating the exercise and gait function of patients in Parkinson's disease, they showed that TCM exercise can effectively improve the movement and gait function of patients. Pei Ziwen[11], Zhang Guojuan[12], Xiao Huiling[13] Also use PD related quality of life (PDQ-39) scale, Montreal cognitive assessment scale (MoCA) and activity specific balance confidence scale (ABC) to assess the Parkinson's quality of life, social cognition and disease psychology, the results show that traditional Chinese medicine movement also for Parkinson's patients quality of life, social cognition and disease psychology. Some studies believe that traditional Chinese medicine exercise can also improve patients' anxiety and depression, and relieve non-exercise symptoms such as postural hypotension and constipation[14]. Therefore, TCM exercise can effectively relieve the symptoms of Parkinson's patients, but TCM exercise is mostly suitable for people with mild to moderate Parkinson's movement disorder[15].

### **2.2. Physiological effects of TCM exercise intervention in Parkinson's balance disorder**

Studies have found that TCM exercise can alleviate gait disorders by enhancing visual network function, improving energy and neurotransmitter metabolism, regulating brain network function, and reducing inflammatory response and susceptibility to dopaminergic deformation[16]. On the one hand, balance ability is closely related to visual network function and interleukin 1  $\beta$  level. TCM exercise enhances visual network function, downregulates interleukin 1  $\beta$  level, and optimizes the tricarboxylic acid cycle, thus improving the balance function of patients. On the other hand, Parkinson's comprehensive score is related to L-malate, 3-phosphoglycerate, and adenosine levels. TCM exercise can down-regulate L-malate, 3-phosphoglycerate and adenosine, promote  $\beta$ -oxidation of ultra-long chain fatty acids and thus improve the comprehensive symptoms of Parkinson's patients. TCM exercise can also improve HIP2 mRNA levels, and reduced HIP2mRNA expression causes impairment of spontaneous motor function and increased susceptibility to dopaminergic degeneration. Therefore, the mechanism of balance dysfunction in Parkinson's patients is clear.

### **2.3. Sociological effect of TCM exercise intervention in Parkinson's balance disorder**

Patients with Parkinson's gait disorder are usually accompanied by a decline in social function. Although some patients have relieved clinical symptoms, they still have reduced memory, orientation, computing power, language impairment, and even social function defects such as Parkinson's dementia. Unfortunately, the current drugs are not ideal to improve the social function deficit in Parkinson's patients. And then found through the research[17], The TCM exercise intervention method can significantly improve the patients' social function and quality of life.

## **3. Comparison of the treatment effects of various TCM exercise intervention in Parkinson's disease and other methods**

### **3.1. Tai Chi Chi**

Taijiquan (Tai Chi) originated in the late Ming and early Qing dynasties, belongs to traditional Chinese martial arts, mainly based on Yin and Yang of Traditional Chinese medicine[18]In theory, tai Chi push hand with the left hand as Yang, the right hand as Yin, the back of the palm for Yang, the palm for Yin, Yin and Yang fluctuation and opposition constraints, like the functions of the viscera of the human body. Through the characteristics of slow, smooth, rigid and soft combined movement, "the same body and mind, both internal and external repair" combines the invisible brain and the invisible thinking with the physical body movement and breathing[19], Take the human body essence, qi and god as the channels to dredge the viscera and meridians, regulate the health qi machine, and enhance the blood circulation of the viscera and muscles[20].

Kurt[21]In a study of 40 PD patients, motor function and quality of life were assessed by Biodex-3,1, BSS scale, stand-up-go timing test (TUGT), PDQ-39, and Unified Parkinson's Disease Rating Scale (UPDRS-). The results showed that the Tai Chi group was better than the control group in improving the gait balance. There are similar studies[13]Forty patients with PD in the early and middle stages were selected. The control group adopted conventional drugs and exercise therapy, and the observation group added tai Chi training on the basis. The results showed that the BBS, self-care ability index (BI) and ABC score of the observation group increased than before the training, but the improvement of the observation group was more significant than that of the control group. Abroad, Vergara-Diaz, G.[22]In one study, 32 PD patients aged between 40 and 75 with disease duration <10 years were randomly divided into tai Chi group and routine training group, and change in gait stability (DTSTV) was set as the main clinical outcome indicator, with UPDRS, PDQ-39, TUGT, and ABC as secondary indicators. The results showed that DTSTV in Taiji group decreased compared with the control group. Observe the secondary indicators of the two groups, except for the UPDRS, the other three indicators were greatly improved and statistically significant compared with the control group. Tube fine red[23]By simplifying 24 tai chi for early PD patients for 24 weeks, the results showed that tai chi group BBS, ABC score and improve significantly better than the control group, and TUG time is significantly shorter than the control group, indicating that tai chi in improving the gait balance of PD patients than control group, using revised fall efficacy table (MFES) and fear fall (FOF) to evaluate the state of patients before and after PD, MFES score and FOF difference before and after the intervention and the intervention group is significantly higher than the control group[24].

Compared with other traditional TCM sports, the treatment of PD has attracted the attention of researchers at home and abroad. Several studies have already confirmed that Tai Chi can improve balance disorders, correct gait posture, enhance limb muscle movement, and improve

motor ability in PD patients. In recent years, with the gradual rise of traditional Chinese medicine, the research on Taijiquan has become more abundant. Current studies show that Tai Chi also plays a positive role in chronic obstructive pulmonary disease, cardiovascular and cerebrovascular diseases, diabetes mellitus and psychological diseases[25].

### 3.2. Badjin

Baduanjin (Eight Trigrams Boxing) originated in the Northern Song Dynasty. It was named because the whole set of sports was composed of eight movements. Including ① hands to day three coke; ② around the bow like carving, ③ conditioning spleen and stomach, ④ five labor, seven injuries to look back; ⑤ head and tail to heart fire; ⑥ hands to strengthen the kidney; ⑦ fist angry eyes and increase strength; ⑧ behind the seven disease elimination[26]. Based on the theory of viscera organs in traditional Chinese medicine, the "heart" is the leading part, and the other, the main blood, the lung, the spleen, the muscles and limbs, the liver main drain, and the kidney is the main seal. Liver drainage machine, make the air machine smooth, with the lung vomit the new main body gas, promote the blood operation, inside to the viscera, outside the limb muscles, coupled with the role of essence qi together to nourish the whole body[27].

Carvalho, L.P.[28]Family exercise on two participants (a mean age of 75 years, PD duration > 3 years) twice a week for 8 weeks, the results showed that two participants had long-term positive effects on gait speed, gait balance and related quality of life. However, due to the small and uncontrolled sample size, the evidence level was not high. Dong shuangshuang[15]In the study, 63 primary PD patients were selected and randomly divided into control group (drug treatment) and 32 patients of treatment group (drug treatment + Baduanjin training 30min, once a day). The gait index and Balance check balance index were measured before and 3 weeks after treatment. The results showed that the gait index and balance index of the treatment group were improved compared with the control group. Yang Dan[29]100 patients with PD balance disorder were randomly selected and divided into observation group (conventional rehabilitation + Baduanjin training) and control group (routine rehabilitation training). The comparison showed that the BBS and Tinetti balance and gait scale (Tinetti POMA) scores of the observation group were higher and the results were better than those of the control group. Shi Xinwei[30], Zhang Shiya[10]In discussing the results of PD, we showed that the exercise ability score (FIM), 6min walking test (6 MWT), UPDRS-, BBS score, and gait posture and stability were better than the balance pad training alone, and also had significant effects in reducing the fall rate[31].

In general, Baduanjin enhances the balance ability of the patients by improving the muscle strength and joint stability of the lower limb muscles, and improves the gait defects in the disease process by enhancing the limb control of the muscles. With its characteristics of soft and gentle coherence, combination of static and static, and coordinated breathing, Baduanjin plays a role in regulating human air movement and coordination and balance. The therapeutic effect for gait balance in PD patients is satisfactory[32].

### 3.3. Wuqinxi

Wuqinxi (Five-Animal Exercise) is a traditional guide of traditional Chinese medicine. It mimics the characteristics of tiger, deer, bear, ape and bird. Including ① tiger play: tiger lift, tiger flutter; ② deer play: deer arrived, deer ran; ③ bear play: bear transport, bear sway; ④ ape play: ape lift, ape pick; ⑤ bird play, bird stretch, bird fly[12]. Wuqinxi is mainly based on the theory of five elements of traditional Chinese medicine, that is, tiger, deer, bear, ape, and bird belong to the five elements of wood, water, earth, fire and gold, and recuperate the five organs of liver, kidney, spleen, heart and lung. The tiger opera, relieving the liver, and regulating the liver qi and blood filling, nourishing the liver and brightening the eyes, strengthening the waist

and strengthening the kidney, and strengthening the human essence, invigorating the energy and nourishing the spleen and stomach, and promote the function[33].

A single-blinded, randomized, controlled study[34]Of which, 40 PD patients aged 60-80 years and Hoehn-Yahr (H-Y stage) stage 1-3 were divided into wuqinxi group (WQ group) and stretching exercise group, 20 people each. Both groups were trained twice a week for 60min each time. Patient gait parameters were mainly observed, using the UPDRS, Mini Balance Assessment System Test (Mini BES Test), TUGT and PDQ-39 scales. The results showed that the gait parameters of the WQ group were significantly improved compared with the stretching exercise group. In the secondary monitoring indicators, the WQ group decreased UPDRS, PDQ-39 score, TUGT time increased, and Mini BES Test score increased, indicating that the improvement of the gait speed, stride length and balance during walking was better than that of the stretching group. Kong Xiangzhen[35]In a study to explore the balance function of PD patients in Wuqinxi, it showed that the PDQ-39 and UPDRS-scores of the wuqinxi group were lower than that of the control group, and the BBS score was higher than that of the control group, indicating that wuqinxi was better than that of the control group in improving the motor balance of PD patients, which was statistically significant[12]. Korean[36]In the study of 100 PD patients, the results showed that the UPDRS-, FOGQ were lower after the intervention; the BBS score was higher than that of the pre-intervention and control group. The PDQ-39 score and the FOGQ score were not statistically significant when compared with the preintervention scores in the control group. It shows that the wuqinxi group is better than the control group in improving the motor function of PD patients and alleviating the fear of falling. Cao Haihao[37]In a similar study, the results showed that the movement trajectory of the pressure center was longer, the elliptical area, TUGT length and PDQ-39 value decreased, the BBS score increased, and the results of wuqinxi group were significant than the control group, confirming that it was better in terms of balance, walking and improvement of life quality of PD patients.

Wuqinxi reduces the reaction time and gait variability during the movement, improves the step speed and stride length, and improves the movement flexibility and balance to a greater extent than the simple stretching movement. It is precisely because of the five birds to the five zang organs and the whole body air machine that wuqinxi can have therapeutic and health care effects in musculoskeletal, cardiovascular, respiratory, immune system diseases, and chronic fatigue syndrome[38]. Therefore, further research are needed to confirm whether Parkinson's patients with cardiovascular and other systemic diseases will benefit more.

### 3.4. Six-word formula

The six-character formula is a kind of Traditional Chinese Qigong exercise in which the different pronunciation of "hush, oh, calling, blowing, hee" and cooperate with the guidance action to affect the movement of qi and blood of different viscera and meridians. The six-character formula is mainly based on the introduction of the lung and the new. Through breathing and movement, the viscera qi machine is promoted to regulate qi, blood, Yin and Yang, and dredge the meridians and collaterals[39].

Wang Wanhong et al. observed the changes of motor function and quality of life of PD patients through visual tracking and six-word formula, and divided them into control group and observation group. The control group received routine rehabilitation treatment, and the observation group received visual tracking and six-word formula on their basis. Motor function, balance ability, gait, and quality of life in PD patients were measured by the UPDRS-, trunk pressure center (COP), TUGT, and PDQ-39. The results showed that the UPDRS-, PDQ-39 score, COP displacement and TUGT time decreased before and after the treatment, and the observation group was better than the control group. This indicates that the motor function, balance, gait and quality of life of PD patients were more significantly than the control



group[40]. However, because there are few studies on improving the six-character formula in PD, more high-quality studies are needed to confirm its effectiveness in the future.

#### 4. Discuss

In conclusion, based on the research and exploration related to TCM exercise and Parkinson's disease in the past five years, it has reached a consensus that TCM exercise can effectively relieve the symptoms of patients with mild to moderate Parkinson gait balance, improve patients' exercise posture, reduce the occurrence of adverse events such as falls, and the effect is comparable to drug treatment. In addition, TCM sports have a long history, no trauma, easy to learn, no equipment, no place restrictions, compared with some western medicine sports have a better compliance. Patients can also improve anxiety, depression, improve cognition, improve respiratory function, and develop a healthy lifestyle. Therefore, TCM exercise can be used as a treatment plan and adjuvant means for the treatment of Parkinson's gait disorder.

However, unfortunately, there is still a lack of unified guidelines for TCM exercise therapy in various countries. For the types of TCM exercise intervention, only sports programs for reference are Taijiquan, Baduanjin, Wuqinxi, and six-character formula, etc. There are still many unknown questions to explore in the field of Parkinson's TCM exercise interventions, Such as the ① TCM exercise for the severity of Parkinson's disease, Most studies have only explored PD movement disorders with mild to moderate degrees or early stages, Few studies have found that TCM exercise has no curative effect on severe or late stages; ② The intensity of the exercise intervention, No study has confirmed the difference between high intensity and low intensity TCM exercise for disease recovery, It is suggested that the effect of exercise intensity on the efficacy of Parkinson's patients should be studied in the future; ③ Intervention timing, No studies on different periods in the development of the disease, Differences between TCM exercise intervention in patients at different ages, Therefore, future studies need to further confirm the best target of intervention timing; ④ Time and frequency of movement, Among the many existing studies on TCM exercise intervention programs, Large differences in single and total exercise time, weekly exercise frequency, Recommended that further discussion of how much single exercise time is appropriate in future studies, How long the total exercise takes is the most beneficial time for symptom improvement; ⑤ For different human populations, Most of the PD patients were elderly patients, Elderly patients have more underlying diseases, Therefore, in the future exploration, we should try to distinguish which TCM exercise is more suitable for people with different basic diseases, May be more meaningful for clinical practice; ⑥ The intervention mechanism of other TCM exercises such as six-character formula, Yi Jin Jing and so on is not clear, Further research is needed to prove its scientific nature. Therefore, although the overall efficacy of TCM exercise therapy for Parkinson's gait disorder is satisfactory, there are still many problems that we need to continue to study and improve the subsequent efforts to make it more normative and scientific.

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