

# A Brief Analysis on the Modulation Effect of Ba Duan Jin on Non-Motor Symptoms of Parkinson's Disease

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## Abstract

Parkinson's disease (PD) is a common neurodegenerative disease in middle-aged and elderly people. The non-motor symptoms of PD, such as depression and anxiety, are often ignored in the face of typical motor symptoms such as tremor and bradykinesia. Non-motor symptoms in PD will not only increase the burden of patients, affect the quality of life, but also reduce the effect of PD drug treatment. A vicious circle is formed. At present, PD cannot be cured. Drugs are the first-line treatment, but long-term use in clinical practice will bring various side effects. Clinical studies have shown that Ba duan Jin as an adjuvant treatment can improve the non-motor symptoms of PD and delay the progression of PD. However, the regulatory mechanism of Ba duan jin on non-motor symptoms of PD is still unclear, which needs to be further elaborated in combination with the theory of traditional Chinese medicine.

**Keywords:** Parkinson's disease, Ba duan jin, depressed, anxiety

## 1. Introduction

PD is a degenerative central nervous system degenerative disease that tends to occur in middle-aged and elderly people. China is the country with the largest number of Parkinson's disease patients in the world. With the aging of the population, it is predicted that by 2030, there will be 4.787 million Parkinson's disease patients in China (Chen, F., et al., 2022). Due to the dyskinesia and reduced efficacy caused by long-term drug treatment, non-drug rehabilitation treatments such as Ba duan jin

have received continuous attention in improving PD motor symptoms (Jiang, B., et al., 2022). The neuropsychological aspects of PD nonmotor symptoms are often underappreciated compared with motor symptoms (Khatri, D.K., et al., 2020). PD non-motor symptoms not only reduce the quality of life of patients (Chuquilín-Arista, F., T. Álvarez-Avellón & M. Menéndez-González, 2020), but also affect the treatment effect of motor symptoms (Nodehi, Z., et al., 2021), aggravate disease progression, and form a vicious circle. Studies (Lo Buono, V., et al., 2021) have pointed out that patients with PD

with non-motor symptoms such as anxiety and depression show more severe dyskinesia and lower well-being than patients with motor symptoms alone. Nonmotor symptoms may increase the risk of suicide from PD, which is already difficult (Chen, Y.Y., et al., 2021). Previous studies (Carvalho, L.P., et al., 2021) mainly focused on the use of Ba duan jin as a supplementary and alternative drug therapy to improve PD motor symptoms, and the regulatory effect of Ba duan jin on PD non-motor symptoms has not been paid attention to, and the elaboration is not perfect.

## **2. PD Is Characteristic of Non-Motor Symptoms**

As people with PD age and progressively worsen their condition, there is a downward trend in physical functioning, mental health, and social adjustment. Nonmotor symptoms of PD are closely related to age and course of the disease, although some nonmotor symptoms, such as loss of smell, sleep disturbance, constipation, and depression, may appear early in the course of the disease (Chaudhuri, K.R., L. Yates & P. Martinez-Martin, 2005).

### *2.1 Depression and Anxiety Play an Important Role in Pd Non-Motor Symptoms*

Neuropsychological symptoms represented by depression and anxiety are important and common PD non-motor symptoms. Current studies (Reijnders, J.S., et al., 2008) have found that the incidence of depression in PD patients worldwide is about 35%, and even more than 90% in some studies. The overall reported prevalence of PD anxiety disorders is 31 percent clinically on average (Broen, M.P., et al., 2016), which can exceed 50 percent considering neglected atypical anxiety presentations (Dissanayaka, N.N., et al., 2022). Sleep disturbances affect 40 to 90 percent of patients with PD (Suzuki, K., et al., 2015). Fatigue affects 44 to 56 percent of PD patients (Siciliano, M., et al., 2018). Pain occurs in 25 percent of patients with PD (Mylius, V., et al., 2021). Constipation is considered the most common autonomic and gastrointestinal symptom among nonmotor symptoms of PD, affecting 24.6 to 63 percent of patients (Stocchi, F. & M. Torti, 2017). The incidence of respiratory symptoms was 24.0%~39.2% (Baille, G., et al., 2019). Depression and anxiety play important roles as typical neuropsychological features of PD non-motor symptoms (Thobois, S., et al., 2010; Maillet, A., et

al., 2016). Depression and anxiety often coexist clinically and share similar pathogenesis (Zhu, K., J.J. van Hilten & J. Marinus, 2017). On the basis of depression, fatigue (Béreau, M., et al., 2022), autonomic disorders (Sklerov, M., et al., 2022), and increased pain may occur (Li, J., et al., 2021); Anxiety can further cause sleep disturbances (Du, S., et al., 2022) and impulsive personality disorder (Waskowiak, P., V. Koppelmans & M.F.L. 2022). Apathy often occurs at the same time as depression and anxiety, and some studies believe that the apathy symptoms of PD may be incidental phenomena of depression, anxiety and other symptoms in most cases, without specific neuropsychological characteristics (Foley, J.A. & L. Cipolotti, 2021). Patients with PD with depression and anxiety have a higher proportion of respiratory symptoms such as dyspnea (Lever-van Milligen, B.A., et al., 2017). "Fear of falling" is often secondary to a psychological feature after a fall, which can exacerbate depression, anxiety, and confidence, leading to further deterioration of motor symptoms in PD patients and increasing the risk of falls (Turhan Damar, H. & C. Demir Barutcu, 2022).

### *2.2 PD Non-Motor Symptoms Are Physical and Mental Disorders*

According to the clinical manifestations of PD, "all winds and dizziness belong to the liver", and TCM can distinguish the disease as "fibrillation". The pathogenesis of PD is based on the decline of normal physiological functions of the human body. "Seven Eight", "Liver Failure". "Eight-eight", "kidney failure". With age, gradually "tendons can not move" and "The body reaches its limits". Non-motor symptom, which can be understood as "fibrillation" and "depression", "sleeplessness", "fatigue" and other combined diseases. On the one hand, "qi depression" can produce "wind", "fire", "phlegm", "stasis", "deficiency", etc. which are combined into diseases; On the other hand, PD is manifested as "liver, spleen and kidney deficiency, and deficiency wind internal movement", on this basis, it can be secondary to "cardiac loss of nourishment", "sputum depression" and "stasis". Due to the smooth mood of the liver, although there are differences in the order of "due to depression" and "depression due to illness", non-motor symptoms such as depression and anxiety in the course of PD, the pathogenesis in "liver depression" are recognized by most doctors of

traditional Chinese medicine.

As mentioned above, depression and anxiety play an important role in PD non-motor symptoms. A variety of complex and diverse PD non-motor symptoms often appear and worsen on the basis of neuropsychological characteristics such as depression and anxiety. On the other hand, as in clinical (Cong, S., et al., 2022) and microanatomy (Salehi, M.A., et al., 2022), depressive symptoms show their independence compared to PD motor symptoms. Sensory-related symptoms, such as pain, can be clinically classified according to whether they have a musculoskeletal or central origin (Chaudhuri, K.R., D.G. Healy & A.H. 2006). Hypotension or loss of smell may precede motor symptoms associated with dopamine deficiency (Bohnen, N.I., et al., 2008). Constipation and sleep-related symptoms (Pont-Sunyer, C., et al., 2015) can occur more than 10 years prior to PD diagnosis. It can be seen that PD non-motor symptoms can be classified as physical and mental diseases.

### 3. Ba Duan Jin Action Analysis

Ba duan Jin starts with “two hands supporting sky carding SAN JIAO meridian”, mainly stretching muscles and tendons of the extremities and stimulating the meridians of limbs. At the same time, deep abdominal breathing through the diaphragm can massage the chest and abdominal organs and regulate the “Triple-warmer Channel of Hand-Shao yang”. The “Triple-warmer Channel of Hand-Shao yang” presides over all qi, which is the trunk road for the passage of the whole body qi machine. The first action lays the foundation for the smoothness of the whole body qi machine through the carding the “Triple-warmer Channel of Hand-Shao yang”. Abdominal breathing is a core component of Ba duan Jin, which stimulates the parasympathetic nerve by increasing the level of carbon dioxide in the blood, while reducing cortisol levels, achieving stress relief and improving anxiety (Chen, Y.F., et al., 2017; Subbalakshmi, N.K., P. Adhikari & P. Shanmugavel Jegathan, 2014; Ma, X., et al., 2017).

“Open the bow left and right like a condor” is also known as “left liver and right lung, like shooting eagles.” By stretching the arms in reverse, the chest cavity is fully extended, breathing is promoted and circulation is improved. The second type of action stretches

and stimulates the “Lung Channel of Hand-Tai yin”, widens the chest, so that the mood is smooth, and the mind becomes active. Studies (Cong, C., et al., 2016) have shown that the 24-week eight-dan jin intervention delayed the decline of lung function in elderly patients with COPD and reduced their depression and anxiety levels.

“Regulating the Spleen and Stomach Need Be Single-lifted” pulls the digestive system organs, promotes gastrointestinal peristalsis, improves digestion and absorption, reduces bloating and improves appetite through the upper limbs up and down, elastic cooperation and pulling. PD gastrointestinal symptoms are closely related to the intestinal microbiota and the “brain-gut axis” (Shen, T., et al., 2021; Menozzi, E., J. Macnaughtan & A.H.V. Schapira, 2021), and Ba duan jin improves the symptoms of constipation by regulating the intestinal flora (Hongmei, S., 2012) and regulating the secretion and expression of Brain-gut peptides (Gao Yuan, W.J., Chen Hui, Wu Jiayong, Shi Jingmei & Huang Minghan, 2018). Studies (Zeng Jinhao, P.H., Zhang Yiliang & Hu Xia, 2016) have shown that 12 weeks of Ba duan jin intervention can significantly improve gastrointestinal symptoms such as bloating, nausea and vomiting, and decreased appetite in patients with functional dyspepsia compared with the control group taking domperidone.

“Five labors and seven injuries look back.” After expanding the chest cavity, gradually enhance the range of motion of the neck and shoulder joints, which can correct the cervical facet joint disorder, and at the same time move the small eye muscles, improve the blood circulation of the neck and brain, reduce the stimulation of the sympathetic nerve and vertebral artery, and relieve fatigue, pain and other discomforts. The five internal organs strain and the seven emotions internal injuries can be caused and effected by each other, and the “large vertebral point” is stimulated when “looking backwards”, which is also known as the “hundred labor point”, which indicates that this point can make up for the five internal organs. That is just the embodiment of “form labor and tirelessness.” Studies (Chengrui, Y. & T. Ping, 2020) pointed out that the intervention of Ba duan Jin in the elderly population can improve the level of microcirculatory metabolism, promote the absorption of lactic acid, and reduce the symptoms of limb fatigue.

“Shaking the head and tail to remove the heart fire” takes the spine as the axis, pitches and swings, increases the joint flexibility of the neck, waist and hip, pulls the internal organs suspended on the spine, and stimulates the circulation and urinary system. In traditional Chinese medicine, if the “heart fire” is excessive, it will see palpitations, dreams, insomnia, upset, etc. The swaying motion of the head can stimulate the “large vertebral points”, assist in removing the heart fire. The fifth movement can make the “heart and kidneys intersect” and sleep peacefully. Studies (Chen, M.C., et al., 2012) have confirmed that Ba duan Jin can improve the quality of sleep in the elderly. This is associated with promoting melatonin secretion, reducing the active level of the hypothalamic-pituitary-adrenergic axis, and inhibiting hyperarousal (Hou Jiangtao, et al., 2022). Especially for patients with anxiety and insomnia, there is a double therapeutic effect, and studies (Wang Fang, et al., 2022) have shown that after 3 months of Ba duan jin intervention, patients have anxiety relief and sleep quality is improved.

“Climbing the kidney waist with both hands” is carried down along the sides of the spine with both palms, accompanied by a large forward flexion and extension of the spine, stretching and stimulating the waist. This movement stimulates the muscles and relieves pain by stretching the spine to stimulate the muscles and relieve the muscles and circulation (Sa Zheyang, et al., 2017). Through the up and down movement of both palms and the pitching motion of the lower back, the “Urinary Bladder Channel of Foot-Tai yang” can be stimulated. Some physicians (Wang Rui, Z.Z., Liu Lian & Tang Lixin, 2021) pointed out that the bladder of the “Urinary Bladder Channel of Foot-Tai yang” has a regulating effect on the human spirit.

“Gathering fists and anger to increase strength” through toe grasping, horse steps, fist clenching, angry eyes, teeth gritting and other movements in the form of strong static force to strain the corresponding muscle groups, which can strongly stimulate the limb meridians and increase strength. Angry eyes, glaring, punching fists, etc. act on the “Liver Channel of Foot-Jue yin”, so as to relieve liver depression and improves mood. Professor Deng Tietao (Chen Ruifang, Z.B. & Deng Tietao, 2017) pointed out that because the “Kidney Channel of Foot-Shao yin” walks obliquely on the soles of the feet,

through the toes to grasp the ground and grit the teeth, it can stimulate the “Kidney Channel of Foot-Shao yin”, “replenish the kidney essence”, “fill the brain pulp”, and calm the mind. The improvement of depression and anxiety symptoms by Ba duan jin is related to the regulation of the activity and connectivity of corresponding brain regions, the influence of neuroinflammatory factors, the regulation of monoamine neurotransmitter system, the “hypothalamic-pituitary-adrenal gland” axis, and the “microbiome-gut-brain” axis (Heuschkel, K. & K.P.C. (2020; Sanada, K., et al., 2020). A number of studies (Lu Ying, Z.X., Jiang Jing, Chen Chao & Yang Li Jie, 2020) have shown that the Ba duan jin intervention has a positive effect and great potential for depression and anxiety.

Through seven heel lifting and lifting movements, the spine is gently concussed, which gently stimulates the internal organs and meridians of the whole body. When lifting, the mind is concentrated on the “Bai hui point”, accompanied by inhalation; Relax your mind and body as you fall, and exhale with it. Studies (Liu, H.F., et al., 2008) have pointed out that the mind-shifting practice of Ba duan Jin improves the regulatory conversion function of the excitation and inhibition areas of the cerebral cortex through exercise, so that it can be adjusted and rested. This can help build a calm and comfortable state of mind, reduce the impact of other bad emotions and cognition, and enhance self-control.

#### **4. Ba Duan Jin Is a Mind-Body Movement**

Previous studies on the relationship between PD and exercise (Mak, M.K., et al., 2017) confirmed that exercise can help delay the progression of PD. Studies (Sacheli, M.A., et al., 2019) have shown that exercise may help improve depression and anxiety by enhancing dopaminergic neuronal function and reward-related responsiveness projected in the substantia nigra and midbrain margins. Exercise has also been shown to improve subjective sleep experience and objective sleep quality in patients with PD (Amara, A.W., et al., 2020). Ba duan jin is an easy-to-play low-to-medium intensity aerobic exercise. Comprehensive preliminary studies (Wang, K., et al., 2021; Reynolds, G.O., et al., 2016) showed that aerobic exercise, strength training, especially physical and mental exercise provide a feasible and potential adjuvant treatment for PD non-exercise



symptoms.

Mindfulness refers to the individual's active focus on the present moment and an open mind to the present state of consciousness (McConnell, P.A. & B. Froeliger, 2015). At its core, mindfulness is to help individuals become aware of automated thinking and behavior by increasing present experience, developing flexibility in response, and increasing emotional tolerance (Sun Tengwei, Y.Y., Jin Yu & An Junxiu, 2021). This is highly consistent with the characteristics of the "Regulating the spirit" in the Ba duan jin. The Ba duan Jin can be seen as a dynamic "mindfulness meditation". Multiple studies (Wang, K., et al., 2021) have shown that mindfulness-based exercises that incorporate mindfulness theory can improve overall cognitive function, sleep quality, and quality of life in PD populations.

### 5. Key Points of the Ba Duan Jin

Ba duan Jin includes eight movements carefully choreographed for each meridian and internal organs, focusing on the overall symmetry and harmony, "yin and yang coordination". During exercise, the mind is concentrated and the body is relaxed, and only moves as attention slowly shifts. Each movement has a slight pause to deepen the stimulation of proprioceptors and strengthen muscle contraction. Ba duan Jin can often be practiced in groups, which increases the opportunity for emotional communication between PD patients while exercising, and is also conducive to channeling psychological emotions. Finally, the effect of inner spirit and external body comfort is achieved.

### 6. Summary

In traditional Chinese medicine, only "keep both form and god" can "prolong their lives." Under the guidance of the theory of "the unity of form and god", Ba duan Jin integrates qigong, guidance, martial arts, and medical theory, organically combining the three aspects of mind and mind, breathing, and body movement. Ba duan jin treats both body and mind, which is in line with the characteristics of PD non-motor symptoms "physical and mental diseases", aiming at the pathogenesis of "weakness of righteousness" and "liver depression", stimulating the "Liver Channel of Foot-Jue yin", improving mood, and effectively improving the non-motor symptoms of PD.

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