ISSN: 2476-230X

Review Article

Cardiology: Open Access

Effects of Baduanjin on Various Diseases: An In-Depth Analysis and Research Review

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Submitted: 2024, Jan 27; **Accepted:** 2025, Jan 15; **Published:** 2025, Feb 06

Citation: Wang, T., Shen, J., Xu, Y., Liu, W. (2025). Effects of Baduanjin on Various Diseases: An In-Depth Analysis and Research Review. *Cardio Open, 10*(1), 01-06.

Abstract

Baduanjin, a traditional Chinese exercise, holistically regulates the body, mind, and breathing, exerting positive influences on the prevention and recovery from diverse diseases. This article comprehensively analyzes the effects of Baduanjin on individuals with different diseases, and also highlights the limitations of existing research. The purpose is to allow medical professionals to better understand the overall efficacy of Baduanjin on various diseases, so as to provide patients with more precise treatment suggestions.

Keywords: Baduanjin, Physical Function, Quality of Life, Mental Health

1. Introduction

Baduanjin is a prevalent form of traditional Chinese exercise, alongside Tai Chi and Wuqinxi. Baduanjin consists of eight simple, slow, and relaxing postures and movements, and each of them has a different efficacy on physical health [1]. Different from traditional aerobic or resistance exercises, Baduanjin places a great emphasis on the organic combination of postures, movements, meditation, and breathing. This approach is consistent with traditional Chinese medicine theory and aims to cultivate vitality and optimize both physical and mental health [2]. The versatility of Baduanjin is reflected in its ability to effectively address a variety of physical functions affected by different diseases. It improves muscle strength, balance, coordination, and cardiopulmonary function. In addition to its physical benefits, Baduanjin has been shown to successfully reduce symptoms of depression and anxiety in people with physical or mental illness, thereby improving overall quality of life. Many systematic reviews highlight the effectiveness of Baduanjin in reducing depression and anxiety in diverse populations. Moreover, it has positive influences in improving various clinical conditions, including hypertension, chronic obstructive pulmonary disease, kidney transplantation, stroke, heart failure, and coronary heart disease [3-10]. In addition, Baduanjin has a positive impact on physiological responses such as blood sugar and blood lipid levels [11].

Recent meta-analyses have examined how Baduanjin promotes physical function, physiological domains, and cognitive function in adults, but most studies have focused on specific diseases. This article integrates the efficacy of Baduanjin in treating various diseases. Understanding the positive effect of Baduanjin on disease treatment can provide patients with more comprehensive and scientific rehabilitation guidance and support patients to move towards comprehensive health. This study aims to comprehensively explore the potential efficacy and mechanism of Baduanjin, and provide scientific basis for formulating targeted sports rehabilitation programs in the future. It also suggests new research directions for studying the effects of Baduanjin on cardiopulmonary and cognitive functions.

2. Therapeutic Mechanism and Effect

2.1. Coronary Heart Disease

Coronary heart disease (CHD) ranks among the leading global causes of mortality [12]. Percutaneous coronary intervention (PCI) serves as an effective treatment method for reducing mortality and alleviating angina symptoms. However, despite these benefits, 40% of patients still experience symptoms of anxiety or depression during follow-up, resulting in a generally low quality of life [13-15]. Guidelines provided by the American Heart Association recommend cardiac rehabilitation (CR) for CHD patients post-PCI, advocating the integration of exercise-based cardiac rehabilitation with conventional pharmacotherapy [16]. Numerous studies have demonstrated the positive impact of regular aerobic exercise on myocardial microstructure. This impact encompasses the reduction of myocardial fibers, improvement in valve elasticity, heightened sympathetic nerve excitability, and an increase in the content of catecholamines in the blood. These alterations contribute to the enhanced contractility of the myocardium, improved blood-pumping capacity, and a significant enhancement of cardiac function [17,18].

Li et al. indicated that the Baduanjin intervention group effectively alleviated anxiety and depression in post-PCI patients when compared with the control group. This intervention also led to improvements in self-care skills and the promotion of daily activities. The positive changes observed in both SAQ and SF-36 scores further substantiate the notion that Baduanjin contributes to an enhanced quality of life [10]. Functioning as a low-intensity aerobic exercise, studies have demonstrated that Baduanjin can serve as a complementary and alternative therapy for exercise rehabilitation in individuals with cardiovascular disease. This usage has shown efficacy in improving clinical outcomes and reducing the incidence of adverse cardiovascular events [19]. In the realm of cardiac rehabilitation, Baduanjin assumes a pivotal role by offering a convenient and effective exercise option for patients with coronary heart disease. It represents a beneficial avenue for enhancing both the quality of life and mental health of these individuals.

2.2. Heart Failure

Heart failure is a complex clinical syndrome, stemming from the advanced stages of various heart diseases, marked by structural or functional abnormalities of the heart that impact the systolic and/or diastolic function of the ventricle [20]. Patients with heart failure often experience reduced cardiac function and exercise capacity, significantly compromising their overall quality of life (QOL). Exercise-based cardiac rehabilitation (EBCR) has demonstrated effectiveness in enhancing cardiac function, exercise tolerance, improving QOL, and alleviating symptoms in heart failure patients [21,22]. However, traditional exercise rehabilitation is hindered by being time-consuming, expensive, and complex, while facing challenges related to patient physical limitations and equipment constraints. To address these issues, simple, easy-to-learn, and cost-effective exercise programs are recommended as supplementary approaches to maximize benefits.

Baduanjin is a simple, easy-to-learn, and economical home exercise method. Studies indicates that it is effective and safe in improving cardiac function, reducing myocardial oxygen consumption, and improving exercise capacity in elderly patients with heart failure [23]. A meta-analysis demonstrated that Baduanjin exercise significantly improved exercise capacity in patients with heart failure using the six-minute walk test (6MWT) [9]. Baduanjin has been shown to increase antioxidant enzyme levels, promote metabolism and blood circulation, reduce oxidative stress, and ultimately help improve the quality of life of heart failure patients [24]. Compared with other traditional Chinese exercise, Baduanjin stands out for its ease of learning and low physical requirements. Its convenience makes it particularly suitable for heart failure patients to exercise at home, thereby it is a promising alternative for cardiac exercise rehabilitation.

2.3. Chronic Obstructive Pulmonary Disease

Chronic obstructive pulmonary disease (COPD) is a common, preventable, and controllable lung disorder. In addition to respiratory difficulties and airway restrictions, COPD can also adversely affect mental health, leading to conditions such as anxiety and depression [25]. Daily activities such as speaking, eating, and dressing in patients with advanced COPD are significantly limited due to reduced cardiopulmonary function. Acknowledging the comprehensive impact of COPD, the Global Initiative for Chronic Obstructive Lung Disease (GOLD) designates pulmonary rehabilitation programs as standard treatment for COPD patients. These programs underscore the significance of exercise training in alleviating symptoms, mitigating disease exacerbations, and enhancing the overall quality of life for individuals coping with COPD [26,27].

Baduanjin, guided by the holistic principles of traditional Chinese medicine, constitutes a comprehensive training approach encompassing endurance, breathing, and flexibility exercises. Research indicates that, in comparison to control groups, COPD patients engaging in Baduanjin exercises demonstrated significant enhancements in lung function and exercise capacity indicators, including FVC, FEV1, FEV1%, FEV1/FVC, and 6MWD through respiratory control [28,29]. Although Baduanjin exercises effectively increased the partial pressure of oxygen (PaO2), their impact on reducing the partial pressure of carbon dioxide (PaCO2) remains uncertain [5]. Moderate intensity of Baduanjin can effectively enhance the cardiopulmonary exercise load and improve the cardiopulmonary function of COPD patients. A meta-analysis showed that Baduanjin exercises significantly improved patients' quality of life, as evidenced by quality of life scores (SGRQ, SF-36). Therefore, as part of rehabilitation treatment, Baduanjin exercise can help improve the lung function, exercise capacity, health status, psychological state and quality of life of patients with stable chronic obstructive pulmonary disease.

2.4. Stroke

Stroke is a leading cause of disability and death around the world, and therefore, stroke survivors require appropriate rehabilitation exercises as early as possible [30]. Many stroke patients exhibit low levels of cardiovascular fitness, restricting their mobility and contributing to deconditioning, heightened sedentary behavior, and an elevated risk of recurrent strokes. Clinical guidelines underscore the importance of incorporating aerobic exercise into stroke rehabilitation programs [31].

Baduanjin involves the coordinated movement of breathing, upper and lower limbs, emphasizing deep and regular breathing to enhance oxygenation, optimize brain function, and improve cognitive abilities such as concentration and flexibility of thought. This exercise modality enhances overall nervous system coordination by promoting harmony between the brain and cerebellum, crucial for functions like movement control, balance, and posture maintenance. Through balance training, Baduanjin engages core muscles, enhances body stability, improves balance, and refines postural control [32]. Additionally, Baduanjin contributes to the promotion of functional recovery in non-necrotic brain tissue, stimulates nerve excitement, and facilitates proprioception recovery [33]. The effectiveness of Baduanjin in enhancing balance function, motor abilities, and activities of daily living for stroke patients is particularly notable after six weeks of training [7].

2.5. Hypertension

Exercise serves as a crucial non-pharmacological intervention for preventing, treating, and managing elevated blood pressure [3]. By adhering to reasonable exercise prescriptions, patients can effectively regulate blood pressure, enhance overall health, and improve their quality of life. The consensus document from the European Association of Preventive Cardiology (EAPC) and the Hypertension Committee emphasizes the blood pressure-lowering effects of aerobic endurance training, dynamic resistance training, and isometric resistance training for individuals with hypertension and high-normal pressure [34]. Among these, low to moderate intensity aerobic exercise is particularly favored as an exercise therapy for hypertensive patients.

Regarding the relationship between Baduanjin and hypertension, a randomized controlled trial found that there was no significant difference between Baduanjin and antihypertensive drugs in lowering blood pressure. However, combined treatment with Baduanjin significantly reduced systolic blood pressure, diastolic blood pressure, blood glucose, and total cholesterol levels compared with antihypertensive drugs alone. In addition, a study compared the effects of three traditional Chinese exercise therapies on hypertension, and the results showed that the combination therapy of Baduanjin plus antihypertensive drugs showed advantages in regulating systolic blood pressure, diastolic blood pressure, and endothelin [4]. Baduanjin also significantly increases the content of nitric oxide (NO) in the treatment of hypertension, further proving its effective improvement in hypertension. Therefore, this low-to-moderate exercise regimen shows positive effects in patients with hypertension.

2.6. Kidney Transplantation

Kidney transplantation has emerged as the preferred treatment for end-stage renal disease, leading to improved recipient and graft survival, as well as enhanced quality of life. Advances in surgical techniques, immunosuppressive regimens, and perioperative management have contributed to the success of kidney transplantation [35,36]. While guidelines recommend a healthy lifestyle, including regular physical activity, kidney transplant recipients often report low physical activity levels, energy depletion, and fatigue. The use of immunosuppressive drugs also poses a relatively high risk of muscle loss and osteoporosis. Given the strong association between physical inactivity and cardiovascular disease risk, as well as overall mortality, engaging in physical activity becomes crucial for the recovery of kidney transplant recipients. Physical exercise is believed to have positive effects on their recovery, encompassing improvements in exercise capacity, muscle strength, cardiorespiratory fitness, and overall quality of life.

A prospective randomized controlled trial investigating the impact of physical exercise on kidney transplant patients demonstrated that Baduanjin can enhance physical function in these individuals, as evidenced by improvements in the six-minute walk test and the 30-second chair stand test. Concurrently, assessments using the Anxiety and Depression Scale revealed that Baduanjin significantly reduced the incidence of anxiety and depression among kidney transplant recipients [6]. These findings underscore the clinical significance of low-to-moderate intensity Baduanjin in improving mental health and self-management abilities post-kidney transplantation.

2.7. Obesity

Overweight and obesity stand as risk factors for numerous chronic diseases, including diabetes, hypertension, and cardiovascular disease [37]. Low-carb diet combined with long-term exercise plays a significant role in weight loss. Jia et.al investigated the lipid-lowering and weight-loss effects of Baduanjin combined with a low-carb diet [11]. Research shows that for overweight patients, 4-8 weeks of Baduanjin intervention or combined with low-carb diet (LC) intervention can significantly reduce weight, body mass index (BMI) and waist circumference (WC) in a short period of time, and is effective Prevents the development of central obesity. Both interventions not only produced significant improvements in external measures, but also significantly improved body composition and quality of life, improved lipid metabolism, and reduced appetite in overweight or obese patients. In low-income families, this combined approach to fat loss improves overall family quality of life.

2.8. Cancer and Cancer-Related Fatigue

Breast cancer is a prevalent cancer among women globally. While breast cancer itself may not be particularly lethal, the aftermath of treatment in breast cancer survivors can lead to various issues, including joint damage, sleep disturbance, reduced quality of life, and negative mental health conditions [38,39]. A significant number of cancer patients, up to 75%, may experience mild to severe cognitive impairment within months or even years after surgery, making cognitive impairment the most common complication reported in psychological assessments of breast cancer patients [40]. Exercise has emerged as a safe and effective intervention for managing numerous adverse effects of cancer treatment, encompassing fatigue, psychological distress, functional decline, and unfavorable changes in body composition.

Several studies have demonstrated the benefits of Baduanjin in improving the quality of life and mental well-being of breast cancer patients [41,42]. Assessment of post-surgery patients' quality of life utilized tools such as the Functional Assessment of Cancer Treatment for Breast Cancer (FACT-B) scale and the 36-item Short Form of Quality of Life (SF-36), along with the Self-rating Anxiety Scale (SAS) and the Self-rating Depression Scale (SDS) to evaluate mental health. Research indicates that the quality of life in the Baduanjin intervention group surpasses that of the control group, with Baduanjin exercise contributing to a reduction in levels of anxiety and depression [43]. The study also found that Baduanjin exercises accompanied by Five Elements music can significantly alleviate anxiety and depression in post-operative breast cancer patients. Compared with conventional health education, Baduanjin can improve the subjective cognitive impairment of breast cancer patients [44].

3. Clinical Significance and Development of Baduanjin

3.1. Clinical Significance

Modern medicine focuses on improving patients' overall quality of life, mental health and happiness, and regards long-term

exercise as an indispensable factor in maintaining physical and mental health to prevent disease and promote recovery. Baduanjin, as a traditional Chinese rehabilitation exercise, can significantly improve muscle strength, balance ability and cardiopulmonary health in the prevention and rehabilitation of various diseases through physical exercise, breathing control and psychological adjustment.

Multiple randomized controlled trials have confirmed that regular Baduanjin exercise training can significantly improve multiple indicators of healthy adults, community-dwelling elderly people and people with chronic diseases, including lower limb proprioception, explosive power, cardiorespiratory endurance, gait speed and flexibility [45-47]. Middle-aged and elderly individuals can also enhance their balance ability, grip strength, diastolic blood pressure, resting heart rate, and gait index through Baduanjin exercise training [48]. Characterized by the combination of movement and stillness, Baduanjin promotes cardiorespiratory health by improving blood pressure, resting heart rate, stroke volume, vital capacity and cardiac output, and is beneficial to patients with cardiovascular and metabolic diseases.

Baduanjin not only focuses on enhancing physical functions, but also emphasizes mindfulness exercises, breathing techniques and musculoskeletal coordination of the limbs. Patients with diseases such as heart failure, cancer surgery, and chronic obstructive pulmonary disease often feel tired for a long time and are more likely to feel tired during exercise. This fatigue state can easily lead to negative emotions such as depression and anxiety. Relevant studies have found that mindfulness-based Baduanjin exercise can effectively increase adiponectin levels, help reduce depressive symptoms in patients with chronic diseases, and provide positive support for mental health [49]. Baduanjin practice pays attention to the symmetry of body postures and movements, control of breathing, calmness of mind, and requires concentration. Through such exercises, negative emotions such as anxiety and depression can be relieved and released, and the adverse reactions that patients may experience during disease treatment can be effectively reduced. These reactions include fatigue syndrome, cognitive impairment, insomnia and other issues, ultimately having a positive impact on the patient's mental health.

Unlike many general physical exercises, practicing Baduanjin does not require any equipment, and the practice is not limited by time and place. Intentionally slow, simple, and easy to learn, these movements are especially suitable for individuals seeking to enhance their physical and mental health. For cancer patients, Baduanjin has gentle movements and moderate exercise intensity, which can effectively strengthen the body without causing excessive fatigue. From the perspective of remote rehabilitation prospects, Baduanjin can be used as a main component of low- to medium-intensity exercise because of its simplicity and ease of implementation. This makes it a promising option for restoring and maintaining physical and mental health. By regulating the flow of energy in the body and enhancing overall vitality, Baduanjin becomes a valuable practice for healing and maintaining physical and mental health.

3.2. Future Development

Baduanjin has proven mechanism of action and clinical significance in disease rehabilitation, making it a feasible choice for sports rehabilitation. However, these studies still require more rigorous research protocols to ensure validity and reliability. First, the medical team needs to develop a Baduanjin exercise plan, including training intensity, frequency, and duration information to ensure that patients can exercise correctly and safely. Second, patients should receive long-term follow-up as much as possible to observe the lasting effects of exercise.

Third, in order to promote the beneficial effects of Baduanjin exercise more widely, especially for patients with a wider range of indications, multi-center, large-sample randomized controlled trials including patients with different types of diseases need to be carried out. In future studies, oxygen uptake will serve as a key indicator of cardiopulmonary function. This method aims to deeply explore the comprehensive effect of Baduanjin on enhancing cardiopulmonary function and provide a clearer basis for its application in the rehabilitation of chronic diseases such as cardiovascular disease. In addition, readmission rates and mortality are considered key endpoints and will be the focus of the study. These endpoints will be carefully reviewed to assess the impact of Baduanjin on patients' overall health status. By closely monitoring these endpoints, researchers can gain a more complete understanding of Baduanjin's actual impact on patient recovery and survival. These measurement indicators are not only helpful for evaluating the therapeutic effect of Baduanjin, but also provide valuable reference for formulating a more scientific and reasonable rehabilitation plan.

4. Conclusion

Through a comprehensive analysis of the research on Baduanjin exercise in disease rehabilitation, it was found that Baduanjin exercise has many benefits for patients with various diseases. First, it promotes joint and muscle activity, enhances balance, and increases muscle strength. Baduanjin regulates the body, mind, and breathing at the same time, so it shows significant therapeutic advantages in terms of quality of life and mental health, helping to improve the quality of life and relieve negative emotions such as anxiety and depression. Additionally, the gentle nature of Baduanjin exercises makes it ideal for remote rehabilitation for patients of all ages and fitness levels. However, it is worth noting that there are some methodological shortcomings in existing studies, including the lack of detailed training protocols and long-term follow-up. In order to better promote the exercise rehabilitation effect of Baduanjin, future studies should adopt more rigorous research designs, including standardized exercise programs and large-sample randomized controlled trials of a wider range of patients.

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