



# Application and Research Progress of Exercise Rehabilitation Nursing in the Treatment of Chronic Heart Failure

Han Shou, Zhewei Shi\*

Department of Cardiology, Zhuji Affiliated Hospital of Wenzhou Medical University, Zhuji 311800, Zhejiang, China

\*corresponding author: shizhewei1990@163.com

DOI: 10.32629/aj.n.v5i3.2827

**Abstract:** Chronic Heart Failure (CHF) is a clinical syndrome caused by various factors leading to abnormal changes in cardiac structure and function, resulting in impairments in both systolic and diastolic functions. CHF primarily manifests as dyspnea, fatigue, and fluid retention, and is the leading cause of death in the terminal stage of cardiovascular diseases. With the aging population and changes in lifestyle, the incidence of CHF is increasing annually, imposing significant burdens on patients and their families. Exercise rehabilitation nursing, as an essential non-pharmacological intervention, has gained increasing attention in the clinical management of CHF in recent years. This article aims to systematically analyze the application of exercise rehabilitation nursing in the treatment of CHF and the progress achieved, thereby improving the prognosis of CHF patients.

**Keywords:** chronic heart failure; exercise rehabilitation; nursing intervention

## 1. Introduction

### 1.1 Definition and Epidemiology of Chronic Heart Failure

Chronic Heart Failure (CHF) is a clinical syndrome characterized by the heart's inability to pump blood efficiently to meet the perfusion needs of tissues and organs due to various factors[1]. This condition not only impacts physiological functions but also significantly affects patients' quality of life. With the advent of an aging society, the incidence of CHF is on the rise, making it a significant public health issue globally[2]. The primary clinical manifestations of CHF include reduced exercise tolerance, dyspnea, and edema. Epidemiological data indicate that approximately 2% to 3% of the global population suffers from heart failure, with the prevalence rising to as much as 10% among those aged 70 and older[3]. The increasing prevalence of risk factors such as ischemic heart disease and hypertension continues to drive up the number of patients with CHF, placing substantial pressure on healthcare systems[4].

### 1.2 Pathophysiological Mechanisms of Chronic Heart Failure

The pathophysiological mechanisms of CHF are complex and varied, primarily involving myocardial injury, dysfunction of compensatory mechanisms, and neuroendocrine abnormalities. Factors such as myocardial ischemia, cardiac tissue pathology, or hypertension can impair cardiac function, leading to insufficient cardiac output. To maintain blood supply to tissues and organs, the body initiates various compensatory mechanisms, such as the activation of sympathetic nervous excitement and the renin-angiotensin-aldosterone system (RAAS). However, prolonged compensatory responses can further deteriorate cardiac structure and function, accelerating the progression of heart failure[4].

### 1.3 The Importance of Exercise Rehabilitation Nursing

Current research indicates that exercise rehabilitation nursing plays a crucial role in the treatment of CHF. Appropriate aerobic and resistance training can improve the exercise tolerance of patients with heart failure, reduce the risk of cardiovascular events, and enhance quality of life[5]. Additionally, exercise rehabilitation helps enhance cardiac pumping capacity, improve peripheral circulation, and alleviate symptoms of heart failure. It can also improve patients' psychological states, reducing anxiety and depression, thereby promoting patients' self-management capabilities.

## 2. Theoretical Basis and Treatment Principles of Exercise Rehabilitation Nursing

### 2.1 Effects of Exercise on the Cardiovascular System

Regular aerobic exercise (such as jogging, swimming, and cycling) improves cardiac function by enhancing myocardial contractility. Exercise increases cardiac output, allowing more blood to be pumped with each heartbeat, thereby enhancing

the body's supply of oxygen and nutrients. This promotes adaptive changes in the heart, such as thickening of the ventricular walls and enlargement of the heart chambers, which help increase endurance and cardiac adaptability[6].

Exercise accelerates blood flow within the body, promoting circulation and reducing blood stagnation. Regular physical activity also helps to dilate blood vessels, enhance vascular elasticity, lower blood pressure, and reduce the risk of arteriosclerosis. Regular exercise can lower levels of low-density lipoprotein (LDL) cholesterol while raising levels of high-density lipoprotein (HDL) cholesterol. Exercise significantly regulates body weight management, insulin sensitivity, and blood sugar control, thereby reducing the risk factors for cardiovascular diseases such as diabetes and hypertension.

## **2.2 Physiological Principles of Exercise Rehabilitation**

Exercise rehabilitation is a therapeutic approach that uses physical activity to promote recovery from injury and improve function. Exercise has a significant impact on the physiological adaptation of muscles and joints, enhancing muscle strength, flexibility, and coordination. Appropriate exercise can gradually restore function to injured or weakened muscles, enhancing the adaptability and regenerative capacity of muscle fibers. Exercise promotes fluid circulation in the joints, improving lubrication, easing stiffness and pain, and aiding in the recovery of joint mobility and function[7].

Exercise rehabilitation accelerates tissue repair by promoting blood circulation and metabolism. During exercise, muscle contractions increase local blood flow, providing more oxygen and nutrients to damaged tissues, which facilitates cellular repair and regeneration. Moderate exercise helps remove metabolic byproducts, reducing discomfort during the recovery process[8].

As seen, the comprehensive physiological effects make exercise rehabilitation play a crucial role in various pathological states, helping patients recover function more quickly and effectively.

## **2.3 Goals and Principles of Exercise Rehabilitation Nursing**

The goals of exercise rehabilitation nursing primarily include enhancing overall physical function, improving mobility, fostering self-management skills, and enhancing quality of life. Tailored exercise programs aim to help patients restore impaired functions, reduce pain, and increase muscle strength, endurance, and flexibility, enabling them to better perform daily activities.

The principle of individualization designs personalized exercise plans based on the specific conditions, medical history, and rehabilitation needs of patients. The principle of progression mandates that exercise loads should gradually increase to avoid excessive fatigue or exacerbation of injuries. The principle of evidence-based practice focuses on creating rehabilitation plans based on methods validated by scientific research and clinical practice. The comprehensive principle emphasizes multidisciplinary collaboration, integrating the opinions of physicians, physical therapists, nutritionists, and other professionals to provide holistic rehabilitation care to patients[8].

# **3. Application of Exercise Rehabilitation Nursing in Chronic Heart Failure**

## **3.1 Walking Exercise Training**

In the exercise rehabilitation care pathway for patients with CHF, walking exercise training is a relatively simple and safe method that patients can easily master. Through the six-minute walk test, a tailored exercise plan is devised for the patients. Specifically, the baseline exercise volume is set to 10-20% of the six-minute walk distance, with a recommendation for patients to train 1-2 times per week. Subsequently, depending on the patient's physical condition, the exercise volume is adjusted appropriately, gradually increasing the amount and frequency of exercise to ensure that patients can eventually tolerate between 3,000 to 5,000 steps, accumulating 40-60 minutes of exercise, 4-6 times per week[9].

For patients with CHF, warm-up exercises are very important. The warm-up usually lasts 5-10 minutes, primarily involving stretching and joint exercises, aiming to acclimatize the patient's body to the upcoming exercise load. During exercise, the duration should be controlled between 25-40 minutes, primarily walking, and the walking speed should be determined based on the patient's age and physical condition. Throughout the exercise, breaks should be taken in phases according to the patient's physical condition, with rest periods lasting 3-5 minutes, ensuring that the continuous exercise time is at least 20 minutes. As for the cool-down, it should last about 5 minutes, mainly involving slow walking to ensure the patient's metabolic rate returns to normal[10].

## **3.2 Proper Use of Exercise Rehabilitation Equipment**

The judicious use of exercise rehabilitation equipment significantly enhances the rehabilitation of patients with CHF[11]. According to numerous scientific studies, body-weight-supported training methods have been proven effective in enhancing the exercise rehabilitation outcomes for such patients. This training involves using body-weight support systems

that encourage patients to actively participate in the exercises, typically consisting of a slow-moving medical treadmill and a pneumatic body-weight reduction device. During exercise training, the basic principle of gradual progression should be followed, appropriately adjusting the reduced weight and the speed of the treadmill based on the patient's tolerance and specific recovery condition. In the initial phase, the reduction in weight should be controlled between 5% to 30% of the patient's body weight, while the treadmill speed should be set between 0.2 meters to 0.5 meters per second. It is recommended that patients train once daily for half an hour, with a continuous participation in the exercise for 3 to 6 months. If the patient feels fatigued during training, an intermittent training approach should be adopted to ensure the sustainability and effectiveness of the training[12].

Additionally, MOTomed therapy has also been proven to further optimize the effects of exercise rehabilitation care. This therapy involves the patient participating in moderate-intensity and regular exercise training through alternating hand-cranked and pedal movements, continuously improving the patient's mobility. For patients with weaker physical functions, MOTomed therapy is highly applicable. Each exercise session should last about 20 minutes, with patients advised to exercise once in the morning and once in the afternoon, participating in training three days a week. Each treatment cycle lasts three weeks, with patients required to undergo two consecutive cycles of treatment to ensure maximized rehabilitation effects[13].

### **3.3 Exercise Rehabilitation Nursing Based on Cardiac Function Classification**

In implementing exercise rehabilitation nursing for patients with CHF, exercise plans should be tailored according to their cardiac function classification. For patients with class IV cardiac function, due to the severity of their condition, special attention should be paid to rest and protection. In such cases, patients should strictly adhere to medical advice, maintain absolute bed rest, and avoid any activities that could worsen their condition. Prolonged bed rest can lead to dysfunction in the patient's joints, so once the patient's condition stabilizes, passive activities should be carried out appropriately. The frequency of these passive activities should be controlled at 3-4 times per day, with each session lasting 8-10 minutes[14]. As the condition gradually improves, patients transition to the active exercise phase. In this stage, nursing staff should provide necessary assistance and support to help patients with exercises like getting in and out of bed, thereby promoting the recovery of bodily functions.

For patients with class III cardiac function, although their condition is relatively mild, they still need to maintain sufficient rest. In such cases, patients should enhance under-bed activities based on adequate rest. The frequency of under-bed activities is also recommended to be 3-4 times per day, but the duration of each activity should be extended to 10-15 minutes. As the patient's physical condition improves and they can stand independently, they are encouraged to engage in daily living activities, such as washing and toileting themselves. These activities not only help improve the patient's ability to live independently but also further promote their rehabilitation outcomes. By gradually increasing the amount of activity, patients gradually regain strength, enhance cardiopulmonary function, and better cope with the challenges brought by CHF[14].

### **3.4 Combining Dietary Management with Exercise Rehabilitation**

Appropriate dietary management is equally crucial for the exercise rehabilitation of patients with CHF. Diet not only provides the necessary nutrition for patients but also helps control weight, blood pressure, and blood sugar levels, reducing the cardiac burden. When formulating a dietary plan, it should follow the principles of low salt, low fat, and high fiber, while ensuring sufficient intake of proteins, vitamins, and minerals.

For patients with class IV cardiac function, dietary management should consist of light, easily digestible foods, avoiding excessive fluid intake to reduce the burden on the heart and kidneys. The daily sodium intake should not exceed 2 grams, and the fluid intake should be controlled at less than 1.5 liters. For patients with class III cardiac function, dietary management should be moderately relaxed, but still, attention should be paid to controlling the intake of salt and fat to prevent weight gain and high blood pressure[15].

During the exercise rehabilitation period, patients should avoid exercising on an empty stomach to prevent hypoglycemic reactions. It is recommended to eat a small amount of easily digestible food 30 minutes to 1 hour before exercise, such as bananas, whole wheat bread, or low-fat yogurt. After exercising, patients should properly replenish fluids and electrolytes to prevent dehydration and electrolyte imbalance.

### **3.5 Combining Psychological Support with Exercise Rehabilitation**

In addition to physical challenges, psychological stress cannot be overlooked in the rehabilitation process of patients with CHF. Emotional issues such as anxiety, depression, and fear can affect the rehabilitation progress. Therefore, in exercise rehabilitation nursing, the importance of psychological support should be emphasized.

Psychological support can be achieved through various means, such as psychological counseling, group support, and

relaxation training. Psychological counseling helps patients better understand their condition and learn to cope with stress and emotional fluctuations. Group support allows patients to feel understood and supported by others with similar conditions, enhancing their confidence in recovery. Relaxation training methods such as deep breathing, meditation, and progressive muscle relaxation help patients relieve tension and improve the quality of life.

#### 4. Conclusion and Outlook

Exercise rehabilitation nursing plays a crucial role in the treatment of CHF. Through systematic aerobic exercise, strength training, and flexibility training, not only can patients improve cardiac function and health levels, but they can also significantly reduce the risk of cardiovascular events. Exercise rehabilitation nursing enhances muscle endurance and promotes blood circulation, helping patients better handle daily life challenges and thereby improving their quality of life. Thus, exercise rehabilitation nursing has become an integral part of the clinical management of CHF.

In the future, the application of exercise rehabilitation nursing in CHF will become more personalized and diverse. With the advancement of technology, remote health monitoring, digital exercise guidance, and personalized health management are expected to become the norm, providing real-time feedback to patients. It is hoped that clinical practitioners will strengthen training and education in exercise rehabilitation nursing and promote multidisciplinary team collaboration to better meet patient needs. Moreover, conducting more clinical research related to exercise rehabilitation and validating its clinical effects, as well as exploring new disease rehabilitation treatments, will be important directions for the development of exercise rehabilitation nursing in the future.

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