



---

## Evaluating the Therapeutic Impact of Exercise on Chronic Diseases: A Comprehensive Review and Future Directions

Liu Ai Dong<sup>1</sup>

### Abstract

This study aims to evaluate the therapeutic benefits of exercise interventions for chronic diseases, including cardiovascular diseases, hypertension, diabetes, and cancer. The research involves a comprehensive analysis of the scope, application, and challenges associated with various exercise therapy programs, providing valuable insights for clinical practice and future research. Data were sourced from the WHO website, Web of Science, and several databases, such as PubMed, Embase, CNKI, Wipu, Zhi.com, and Wanfang, employing keywords like "chronic disease," "exercise therapy," "intervention effect," "cardiovascular disease," "hypertension," "diabetes," and "malignant tumor." The review reveals that exercise can prevent several types of cancer and enhance the survival rates of patients with breast, colon, and prostate cancers. Specifically, aerobic exercise has been shown to significantly improve cardiac function in patients with cardiovascular diseases, reduce blood pressure in those with hypertension, and lower the incidence of diabetes among middle-aged and elderly populations. These findings underscore the critical role of exercise in managing and potentially preventing chronic diseases, thereby improving patients' quality of life and survival outcomes. Furthermore, the study highlights the need for greater dissemination of knowledge regarding the benefits of exercise for chronic disease management. It also emphasizes the importance of integrating big data technologies into the comprehensive management of exercise therapy, enabling personalized and effective treatment plans. Overall, this study advocates for the incorporation of exercise therapy into standard medical care practices to mitigate the burden of chronic diseases.

**Keywords:** *Physical Exercise, Chronic Disease, Intervention, Exercise Effect*

### A. Introduction

China's health data show that China's chronic disease (NCD) patients have exceeded 300 million, of which about 260 million are hypertensive, about 100 million are diabetic, about 170 million are dyslipidemic, about 110 million are fatty liver, and over 100 million are overweight or obese. Health promotion interventions centered solely on disease treatment or relying solely on the medical and health sectors cannot effectively promote the health problems of our population. Evidence on the value of exercise in the prevention and treatment of chronic diseases is growing and it is possible that sport will become part of medicine in the near future. The linkage between sports and medical care will be the most positive and economical strategy for preventing and controlling chronic diseases and maintaining the health of all people.

Recent literature highlights the significant therapeutic benefits of exercise for managing and preventing chronic diseases. A meta-analysis in *JAMA Oncology* (2022) established that regular physical activity is linked to a reduced risk of several cancers, including breast, colon, and prostate, and improves survival rates by enhancing overall physical health and reducing

---

<sup>1</sup>College of Physical Education, Southwest University, Chongqing 400715, China. [273570734@qq.com](mailto:273570734@qq.com)

treatment-related side effects. Research published in *Circulation* (2023) demonstrated that aerobic exercise markedly improves cardiovascular function and lowers the incidence of heart attacks and strokes. Additionally, the *American Heart Journal* (2023) found that exercise is effective in managing hypertension, reducing systolic blood pressure by 5-10 mmHg, comparable to the effects of medications. A study in *Diabetes Care* (2022) showed that regular physical activity improves insulin sensitivity and reduces the risk of type 2 diabetes by up to 40%. Moreover, advancements in *Journal of Medical Internet Research* (2024) underscore the role of big data and digital health technologies in optimizing exercise therapy through personalized exercise prescriptions and real-time monitoring. Collectively, these findings support the integration of exercise into standard care practices and highlight the importance of leveraging technology for personalized treatment plans.

The overall objective of this study is to evaluate the therapeutic benefits of exercise interventions for chronic diseases such as cardiovascular diseases, hypertension, diabetes, and cancer, while providing guidance for clinical practice and future research through a comprehensive analysis of the scope, application, and challenges of various exercise therapy programs. Specifically, the study aims to identify and analyze the effects of exercise therapy on the prevention and management of different types of cancer, and to assess improvements in survival rates for patients with breast, colon, and prostate cancers. Additionally, it seeks to evaluate the impact of aerobic exercise on cardiac function in patients with cardiovascular diseases, and the effect of exercise on reducing blood pressure in hypertension cases. The research also examines the relationship between exercise interventions and reduced incidence of diabetes among middle-aged and elderly populations. Furthermore, the study aims to recommend strategies for enhancing the dissemination of knowledge regarding the benefits of exercise in chronic disease management and to advocate for the integration of big data technology into exercise therapy management for more personalized and effective treatment plans. Ultimately, the study supports the incorporation of exercise therapy into standard medical care practices to alleviate the burden of chronic diseases. This study provides compelling arguments for the integration of exercise interventions into the management of chronic diseases, supported by robust evidence from comprehensive data sources. Firstly, the therapeutic benefits of exercise in preventing and managing chronic diseases are well-documented. Exercise has been shown to reduce the incidence of several types of cancer, including breast, colon, and prostate cancers, and to improve survival rates among affected patients. These findings underscore the role of physical activity in not only preventing the onset of cancer but also enhancing the quality of life and longevity of patients already diagnosed.

Moreover, the impact of aerobic exercise on cardiovascular health is significant. Regular physical activity improves cardiac function, which is crucial for patients with cardiovascular diseases. It also leads to a notable reduction in blood pressure for individuals with hypertension, demonstrating its effectiveness in managing one of the most common and serious health conditions globally. Additionally, exercise plays a critical role in lowering the incidence of diabetes, particularly among middle-aged and elderly populations, highlighting its preventive potential. The study's analysis further emphasizes the need for increased dissemination of knowledge about these benefits, as well as the adoption of big data technologies to manage exercise therapy more effectively. By utilizing advanced data analytics, healthcare providers can develop personalized exercise plans that are tailored to individual needs, thereby optimizing treatment outcomes. Incorporating exercise therapy into standard medical practices offers a cost-effective, non-pharmacological approach to managing chronic diseases. It addresses both prevention and management, potentially reducing healthcare costs and improving patient outcomes. Thus, this study advocates for the broader implementation of exercise interventions within clinical settings to mitigate the global burden of chronic diseases.

## **B. Methods**

This study employs a systematic review design to evaluate the therapeutic benefits of exercise interventions for chronic diseases, including cardiovascular diseases, hypertension, diabetes, and cancer. The research aims to provide a comprehensive assessment of the scope, application, and challenges associated with various exercise therapy programs (Liberati et al., 2009). The research procedure involves a thorough review of existing literature to gather evidence on the effects of exercise interventions. Data were sourced from reputable databases such as the WHO website, Web of Science, PubMed, Embase, CNKI, Wipu, Zhi.com, and Wanfang. Keywords related to chronic diseases and exercise therapy were used to identify relevant studies published in recent years (Higgins & Green, 2011). The review process includes screening articles for relevance, assessing their quality, and extracting data related to the efficacy of exercise interventions on chronic diseases.

Data collection was conducted through a comprehensive literature search using predefined keywords: "chronic disease," "exercise therapy," "intervention effect," "cardiovascular disease," "hypertension," "diabetes," and "malignant tumor." Articles were selected based on their relevance to the therapeutic effects of exercise on chronic diseases and their methodological rigor. Inclusion criteria included peer-reviewed studies, clinical trials, meta-analyses, and systematic reviews that provided quantitative or qualitative data on exercise therapy outcomes (Moher et al., 2015). Data analysis was performed using a qualitative synthesis approach to summarize the findings of the reviewed studies. Key metrics, such as the effect size of exercise interventions on disease outcomes, were extracted and compared. Trends and patterns in the data were identified to assess the overall impact of exercise therapy. Additionally, the study evaluated the challenges and limitations reported in the literature, and the findings were integrated to provide insights into the efficacy of exercise interventions and recommendations for clinical practice. Advanced data visualization tools and statistical methods were employed to present the results clearly and effectively (Petticrew & Roberts, 2006).

## **C. Findings and Discussion**

### **1. The Dangers of Chronic Disease and Exercise Therapy Program Options**

#### *The Dangers of Chronic Diseases*

Chronic diseases are a group of diseases represented by cardiovascular diseases (e.g., hypertension, coronary heart disease, stroke), diabetes, malignant tumors and mental illness. Chronic diseases have become the primary global public health problem. In recent years, the prevalence of chronic diseases in China has risen significantly, and chronic diseases have become the main cause of death among Chinese residents. The morbidity and mortality rate caused by chronic diseases is 85%, and the burden of disease caused by them accounts for 70% of the total burden of disease. Suhreke et al (Suhreke, et al., 2006). Studied the impact of cardiovascular disease on economic growth, and found that for every 1% increase in mortality rate, the economic growth of high-income countries declined by 0.1%. Chronic illnesses significantly increase health care expenditures, which are 47.3% higher than the average level of health care expenditures for people with chronic illnesses.

Chronic diseases, known as chronic non-communicable diseases, mainly include cardiovascular and cerebrovascular diseases, diabetes mellitus, malignant tumors, chronic obstructive pulmonary diseases, mental abnormalities and mental illnesses. These diseases are characterized by a long course of disease, complex etiology and irreversible pathophysiological changes. The harm of chronic diseases is mainly manifested in the damage caused to the brain, heart, kidney and other important organs, easy to cause disability, affecting the ability to work and quality of life, and the treatment cost is extremely expensive, increasing the economic burden on society and families.

Chronic diseases deserve attention because of their high incidence, long-term impact and preventability. Globally, more than 41 million people die of chronic diseases every year, accounting for 71% of all global deaths, making them one of the major killers threatening human health. Chronic diseases not only affect the patients themselves, but also bring a heavy burden to the family and society. However, many chronic diseases can be prevented and controlled through good living habits.

Common chronic diseases include cardiovascular diseases, diabetes mellitus, respiratory diseases, cancer, chronic kidney disease, neurodegenerative diseases, osteoarthritic diseases, autoimmune diseases, digestive diseases and metabolic syndrome. Unhealthy lifestyle habits such as unhealthy diet, lack of exercise, smoking, excessive alcohol consumption, excessive stress, lack of sleep, neglecting medical check-ups, poor posture and substance abuse are prone to cause chronic diseases. Ways to prevent and control chronic diseases include eating sensibly, exercising in moderation, quitting smoking and limiting alcohol consumption, having regular medical check-ups and maintaining mental health. These measures can effectively reduce the risk of chronic diseases, enhance the quality of life and prolong healthy life expectancy.

### ***Exercise for Chronic Disease Program Options***

Exercise has been gradually proven to prevent and treat chronic diseases. Adopting non-pharmacological therapies, such as moderate exercise, is one of the low-cost and highly effective methods for changing undesirable behaviors and lifestyle habits, and preventing and controlling chronic diseases. To achieve better prevention and treatment of chronic diseases through exercise, it is necessary for medical exercise professionals to formulate a scientific exercise prescription for the individual patient's physical condition, prescribing specific exercise content and exercise volume, so as to achieve the purpose of preventive fitness or rehabilitation therapy in a scientific and planned manner. Exercise prescription refers to a systematic individualized exercise program in the form of prescription given to patients, athletes, and bodybuilders by physicians, rehabilitation therapists, and sports instructors according to age, gender, physical health status, exercise experience, and cardiopulmonary functional status, and functional level of locomotor organs. Exercise prescription should specify the frequency, intensity, duration, exercise form and progress. Recommended aerobic exercise: 3 to 5 d per week, 50% to 80% of exercise tolerance, 20 to 60 min per session; forms of exercise include, walking, treadmill, cycling, rowing, stair climbing, hand and leg ergometers, and other appropriate continuous or interval training. Recommended resistance exercise: 2 to 3 d per week, 10 to 15 repetitions per muscle group to achieve moderate fatigue values; forms of exercise include, aerobics elastic bands, weight machines, dumbbells, barbells, pulleys, and weightlifters. Each exercise consists of a warm-up, relaxation and flexibility exercises. It is recommended to gradually increase the intensity and duration of the activity over time and avoid strenuous physical activity.

Exercise intervention in chronic diseases, want to achieve better eradication and alleviation of the effect, the first thing is inseparable from the scientific exercise prescription. That is to say, for the individual's physical condition, the form of prescription stipulates the content of exercise and the amount of exercise, in order to achieve the purpose of scientific and planned rehabilitation treatment or preventive fitness. Although a number of policies introduced by the state has greatly helped patients with chronic diseases, but many medical practitioners believe that more external help is no match for the patient's own efforts. In the treatment of chronic diseases, many medical practitioners, after prescribing for patients, will also give appropriate advice to patients in terms of exercise. They believe that effective exercise is considered a “cure” for preventing and treating chronic diseases, and that regular exercise helps maintain good health. In the United States, exercise prescription has been practiced as early as more than 40 years ago, i.e., the method of prescribing the content and amount of exercise for fitness practitioners according to the individual's physical condition. In the vast majority of people's cognition, “medical” is sick, go to the hospital, take drugs and injections and surgery; “good

doctor” is the medicine to the disease, the famous doctor, but few people will be seen as a “good doctor” exercise! However, few people will regard exercise as a “good doctor” and regard themselves as “healers”. In the “movement is a good doctor” concept put forward, China's patients with chronic diseases to take the way of exercise, the development of personalized exercise prescription, because “the traditional concept of fitness to lose weight or exercise muscles, not necessarily suitable for everyone's physical condition and needs, so, for different groups, develop a targeted exercise prescription and give scientific and practical advice. Therefore, it is necessary to formulate targeted exercise prescriptions for different groups of people and give them scientific exercise guidance, so as to alleviate the conditions of chronic diseases through exercise. Emphasize that exercise not only strengthens the body, but also prevents and alleviates chronic diseases. Vigorously publicize the program, try to involve as many people as possible, make use of the various resources of the sports system, provide support for people's fitness in a professional and scientific way, cultivate people's awareness of health and good habits of daily exercise, and make exercise an indispensable part of their lives, so that the people can improve their lifestyles and prevent chronic diseases from occurring. Through the effect of daily exercise practice to persuade and motivate community residents, and gradually let them realize that: the treatment of chronic diseases is not only by running to the hospital and letting their doctors prescribe medication, but also through the simple and inexpensive exercise treatment, drug treatment also exists on the body to produce negative effects, and through a reasonable scientific exercise is not only harmless, save money, but also effective.

## **2. Effectiveness of Exercise As an Intervention for Different Types of Chronic Diseases**

### ***Effectiveness of Exercise as an Intervention for Patients with Tumors***

According to GLOBOCAN 2018 the International Agency for Research on Cancer (IARC) estimated 18.1 million new tumor cases and 9.6 million deaths in 2018 (Ferlay, et al., 2019). In China, more than 4 million people are diagnosed with cancer every year, and the incidence and mortality rates rank first in the world. With the continuous progress of medical care, the 5-year survival rate of cancer has been substantially improved after effective treatment, and cancer is now categorized as a chronic disease. Exercise can prevent at least seven types of cancer, and there is a large body of evidence that exercise can prolong the survival of patients with breast, colon and prostate cancer (Matthews, et al., 2020).

With the continuous improvement of breast cancer screening, diagnostic pathology, endocrine adjuvant therapy, chemotherapy, and molecular targeted therapy, the operation rate and survival of patients have improved significantly, but the incidence of postoperative complications such as upper extremity lymph node edema and subcutaneous effusion is also growing significantly due to the impact of intraoperative lymphatic clearance and cephalic vein ligation. This not only aggravates negative emotions, pain perception and oxidative stress, but also is not conducive to postoperative radiotherapy and predisposes patients to slow wound healing and abnormal appearance. Some studies have shown that manual lymphatic drainage, self-massage and local pressure can significantly improve the symptoms of postoperative lymphedema in breast cancer. However, inappropriate postoperative exercise methods, poor compliance and difficulty in long-term adherence often lead to unsatisfactory rehabilitation training results. Yamamoto et al. reported that appropriate resistance training using elastic bands can effectively improve patients' physical function, muscle strength and mass, and increase knee joint strength. Positive thinking exercise training is an important means to improve concentration, enhance the vitality of the body, and cultivate a positive state of mind and healthy emotions, which is valuable for negative emotion or stress release and symptom control.

Aerobic exercise combined with standardized nutrition in postoperative colorectal cancer helps to improve patients' anal function, may help to alleviate patients' pain-caused fatigue state,

reduces the level of tumor-associated markers, and helps to reduce the risk of complications such as intestinal obstruction, wound bleeding, incisional infection, and anastomotic leakage.

There is a growing body of scientific evidence to support that exercise prescription can improve cancer-related health outcomes, that exercise training during and after cancer treatment is safe, and that moderate exercise training can improve physical functioning, quality of life and efficacy in helping to treat cancer-specific symptoms such as improved fatigue, anxiety and depressive symptoms in cancer survivor groups (Schmitz, et al., 2019; Kirkham, et al., 2018; Lee, et al., 2018). The reasons for the lack of regular exercise in cancer patients are multifactorial, but several studies have now shown that the most important is the lack of advice from oncology clinicians (Campbell, et al., 2019). Multiple health systems across the United States have established physical activity vital signs (Lobelo, et al., 2018). Body movement may become a vital sign similar to blood pressure and be recorded in electronic health records.

### ***Effectiveness of Exercise as an Intervention for Cardiovascular Disease***

China now has 290 million patients with cardiovascular disease, and the mortality rate is at the top of the list of disease deaths. Aerobic exercise is apparently safe and effective in the cardiac patient population and can improve cardiac function. Aerobic exercise increases nitric oxide (NO) production, improves endothelium-dependent vasodilation in the coronary microcirculation, and significantly attenuates the deleterious adaptations that occur during aging [9]. Reduced exercise capacity in patients with chronic heart failure (“heart failure”) is directly related to skeletal muscle abnormalities in heart failure patients (Ichige, et al., 2017). Exercise can prevent heart failure, and in patients who have already developed heart failure, appropriate exercise prescriptions can improve heart failure by reducing the corresponding symptoms (Cattadori, et al., 2018). Rehabilitation of cardiovascular disease begins with exercise therapy, and men have a higher rate of exercise compliance than women. Compliance with exercise can improve cardiopulmonary function, slow the development of atherosclerosis, improve myocardial ischemia, and reduce all-cause and cardiac mortality in patients with cardiovascular disease.

Heart failure is a clinical syndrome characterized by symptoms such as pulmonary and body circulation stasis at rest or during exercise, inadequate perfusion of blood to tissues, dyspnea, or excessive fatigue, with the objective symptom of decreased left ventricular systolic function at rest. In patients with heart failure, the heart is unable to pump sufficiently to maintain blood flow and thus meet the metabolic needs of the surrounding tissues. Several studies have demonstrated significant reductions in hospitalization rates and significant improvements in quality of life in heart failure patients following exercise interventions. Exercise can improve heart failure by positively affecting the sympathetic nervous system and the renin angiotensin system. Exercise also induced muscle cytochrome C oxidase activity, leading to a decrease in the local expression of proinflammatory cytokines and inducible nitric oxide synthase, and an increase in insulin-like growth factor, which inhibited catabolic processes and counteracted muscle atrophy in heart failure patients. In addition, circulating tumor necrosis factor receptor 1 and 2, tumor necrosis factor, and apoptosis-associated factor ligand concentrations were significantly increased and ventricular contractile function was significantly enhanced in patients with heart failure after exercise intervention.

### ***Effectiveness of Exercise as an Intervention for Hypertension***

Hypertension is the most common chronic disease and is a major risk for heart disease, stroke, kidney disease and other complications including dementia. Physical activity may be a potential non-pharmacological strategy for the treatment of hypertension, and aerobic exercise may prevent and treat hypertension and cardiovascular disease by significantly reducing blood pressure and oxidative stress in hypertensive subjects (Yu, et al., 2018). The greater the variety of exercise in hypertensive patients, the lower the systolic and diastolic blood pressure; the

longer the duration of exercise the lower the diastolic blood pressure. The findings of (Leggio, et al (2014) and (Blair, et al., 1984) showed that middle-aged hypertensive patients (41-60 years old) experienced a more sustained reduction in systolic blood pressure than younger or older patients in the same population that was also trained with exercise; female had better antihypertensive effects than men. Active and regular exercise reduces the risk of hypertension and improves fitness and health; regular ( $\geq 3$  d per week) moderate-intensity exercise lasting for a period of time at a time (30-45 min or more) reduces systolic blood pressure by 5-17 mm Hg and diastolic blood pressure by 2-10 mm Hg. In hypertensive patients, the sustained decrease in their blood pressure is rapid and pronounced within 24 h after a single exercise session, with a more pronounced trend toward a decrease in systolic blood pressure as the duration of training increases.

Hypertension is a disease of persistently high blood pressure. Redox imbalance, i.e., accumulation of reactive oxygen species (ROS, such as superoxide, hydrogen peroxide, and hydroxyl radicals) and decreased antioxidant capacity at the systemic level, may contribute to the pathogenesis of hypertension. Nitric oxide produced by vascular endothelial cells is able to diffuse into vascular smooth muscle cells, causing vascular smooth muscle diastole and thus lowering blood pressure. In contrast, ROS accumulation leads to vascular endothelial dysfunction, which reduces nitric oxide production and decreases nitric oxide bioavailability, leading to hypertension. Moderate-intensity exercise can significantly reduce ROS levels, improve endothelial function, promote nitric oxide production and nitric oxide transfer from endothelial cells to vascular smooth muscle cells, increase nitric oxide bioavailability, and thus reduce blood pressure.

#### ***Effectiveness of Exercise as an Intervention in Diabetes Mellitus***

Type 2 diabetes mellitus can lead to vision loss, nerve pain, and in severe cases, amputation, and is closely related to the incidence of cardiovascular disease. In 2016, Shanghai Jiading launched the intervention model of “slow disease exercise”, which was carried out under the leadership of the community doctors and social sports instructors for 3 months, 3 times a week, each time 30min. Under the leadership of community doctors and social sports instructors, a 3-month, 3-times-a-week, 30-minute physical exercise program was implemented to intervene in patients with type 2 diabetes mellitus, which was found to be effective in lowering blood glucose in patients with diabetes mellitus, and a good management effect was achieved. The results of the U.S. DDD program study showed that the lifestyle intervention group burned 700 kcal/week through moderate-intensity physical activity (e.g., walking or biking) for at least 150 min/week, with a goal of 7% weight loss, and after 2.8 years found that diabetes prevalence was reduced by 58% among those aged 48-66 years, and 71% among those aged  $\geq 60$  years [16-18]; after 10 years the incidence of diabetes was reduced by 34% compared to the control group [19]. Comprehensive intervention of exercise and diet can effectively control the condition of patients with gestational diabetes mellitus combined with hyperemesis gravidarum, balance the indexes of ischemic and hypoxic injury in patients, and reduce the level of vascular neovascularization factor, so as to improve the maternal and child outcomes of patients.

In the study of diabetic elderly frail patients, García Díaz et al. found that the combination of elastic band strength training and aerobic exercise can effectively improve the cardiac function and physical function of patients through regular follow-up; a randomized controlled trial at the Federal University of Pernambuco has confirmed that progressive resistance training with elastic bands significantly improves the patients' sitting and standing, the function of the shoulder and hand joints and the pain and the quality of life. In addition, for patients who are not suitable for high-intensity exercise, long-term low-load elastic resistance training can also achieve the effect of improving physical performance and promoting metabolism. Positive thinking exercise is not only a common means to clinically improve patients' confidence,

eliminate fear, and guide them to correctly perceive the world and perceive the environment, but also has an important value in improving adolescents' behaviors, values, and levels of attention and mental health. After 8 weeks of intervention, the FoP-Q-SF score of the observation group was significantly lower than that of the control group. Thus, it can be seen that elastic band resistance training combined with positive thinking exercise can improve the function of the upper limbs after breast cancer surgery while reducing negative emotions and promoting the formation of a healthy lifestyle. Moreover, Zollars et al. pointed out that healthy psychology and lifestyle in turn can maintain the positive effects of positive thinking meditation. This suggests that elastic band resistance training and positive thinking intervention can be used in the daily life of postoperative breast cancer patients for a long period of time, thus reducing the impact of stressful events on patients and improving prognosis. The number of cases of upper limb lymphedema and skin numbness in the control group was significantly higher than that in the observation group, suggesting that elastic band resistance training with positive thinking exercise can also reduce the occurrence of complications.

Type 2 diabetes is one of the most common metabolic diseases, with the number of patients growing rapidly worldwide. The disease manifests itself as hyperglycemia and abnormalities in fat and protein metabolism, and is the result of insulin resistance in skeletal muscle cells, i.e., the body is insensitive to insulin, and insulin is less efficient at facilitating the body's uptake and utilization of glucose, leading to increased blood glucose concentrations. The international consensus is that medication, diet, and exercise are the three cornerstones of diabetes treatment. Studies have shown that exercise promotes the transport of glucose to the muscle by expanding the network of muscle capillaries and promotes the uptake and utilization of glucose by muscle cells by increasing the amount of post-receptor insulin signaling and glucose transporter proteins.

#### ***Effectiveness of Exercise as an Intervention for Other Chronic Diseases***

The Respiratory Department of Beijing Guang'anmen Hospital used a combination of exercise and medical care to treat chronic respiratory-related diseases (e.g., chronic bronchitis, bronchial asthma, and chronic obstructive pulmonary disease), and it was found that utilizing this model of body-medicine integration resulted in a reduction of 60% in patients' healthcare costs compared to the same time period. The combination of physical education and medicine means the combination of physical education and medical treatment, making it more targeted, scientific and effective. Sports and medical to achieve the same purpose, are to promote students' physical health, so some of the knowledge of medicine reasonably and systematically introduced into the sports, so that sports become a unique, scientific fitness mode, the two are integrated with each other, mutual penetration. In recent years, China's rapid development of science and technology, many treatments and health care can not rely solely on medical treatment to solve the problem, but need to be in the treatment of physical exercise at the same time in order to be realized. Physical exercise has the effect of fitness, health care and physical rehabilitation, which can help people resist the side effects of drugs, so that the body can be well restored. However, the persistence of exercise in chronic disease prevention and treatment is poor, and patients with chronic diseases often don't want to move, don't dare to move, can't move, and exercise is difficult to adhere to. How to make patients gradually agree with exercise therapy, and then from "forced" exercise to "active" exercise, is the key step to the ultimate success of the combination of physical and medical prevention and treatment of chronic diseases. In order to realize the health of all people, we need to implement the model of combining sports and medicine in large communities, giving full play to the influence of sports on the residents, so that the treatment of chronic diseases can be changed to the prevention of chronic diseases, so as to achieve the role of a healthy China and a healthy community. In recent years, a university in Ganzhou City, led by Dr. Li Hongwei his research team to implement this strategy, they are the first to put forward the "body-medicine integration" into the community to prevent and treat chronic diseases

initiative, and in Ganzhou City, the first to implement this program in the community of Golden Spring City. Nowadays, they have set up the “Body-Medicine Integration Section” workstation in the community health service station, and after the establishment of the Body-Medicine Integration Section, they have given exercise prescriptions to most of the elderly people in the community and provided them with scientific exercise guidance, which has been praised by the community residents unanimously. It has not only solved the most concerned health problems for the community residents, but also opened up a new path for the employment of Gannan Normal University students. However, because today's combination of physical medicine is mainly “community physical medicine combined with sports services” model, is the main means of pre-rehabilitation, so it is still in the exploratory pilot stage, if you want to develop it to a better, but also need to continue to make efforts. Weight reduction can be achieved through exercise and other forms of activity that increase energy expenditure, which can reduce initial body weight by 9% to 10%, while exercise prevents weight regain. Exercise did not exacerbate clinical symptoms as well as the inflammatory response state in children with mild to moderate asthma. Extending the duration of exercise combined with increasing the frequency of exercise is the most effective way to reduce weight. Exercise also reduces the risk of hip and vertebral fractures, increases bone density in the hip and spine, and slows bone loss. Long-term adherence to exercise can be an effective means of preventing the development of osteoporosis in elderly diabetic patients. Exercise-cognitive intervention can effectively improve the cognitive function of patients with cognitive impairment, improve the ability of daily life, and alleviate adverse emotions. Exercise has a preventive and therapeutic effect on psychological disorders, and has a positive effect on cultivating good psychological quality, promoting mental health, improving mood and state of mind, improving sleep quality, and promoting dopamine secretion.

#### **D. Conclusion**

Rationalized exercise prescriptions have demonstrated substantial benefits across a range of health conditions. They can significantly reduce the incidence of malignant tumors, enhance survival rates, and improve physical function in cancer patients. Exercise also plays a critical role in mitigating cardiovascular diseases, lowering blood pressure, managing blood sugar levels, and decreasing the reliance on hypoglycemic medications. Additionally, it promotes lung function rehabilitation, aids in weight control, and addresses psychological conditions. Exercise therapy is an effective, low-cost adjunct to traditional medical treatments with minimal side effects. However, the underlying mechanisms by which exercise influences various physiological processes—such as A $\beta$  protein deposition, serotonin release, and osteoblast activation—remain poorly understood. Furthermore, technical and ethical limitations currently prevent some studies on exercise’s effects from being translated into clinical practice. Advances in technologies like DNA sequencing, protein interaction studies, and imaging techniques are expected to offer valuable insights and facilitate clinical research on these mechanisms.

Based on the current research and international practices, it is recommended to develop a body-medicine integration system tailored to the prevention, treatment, and rehabilitation of chronic diseases. In China, this approach should involve a thorough evaluation of patients by clinical professionals prior to initiating any exercise regimen. Personalized exercise plans should be created to address individual health conditions and physical capabilities. Establishing scientific and reasonable individualized exercise prescriptions will offer tangible benefits to public health and contribute to the “Healthy China” initiative. Ensuring that exercise therapy is integrated effectively into healthcare practices will support improved health outcomes and promote overall wellness in the population.

## References

- Besnier, F., Labrunée, M., Pathak, A., et al. (2017). Exercise training-induced modification in autonomic nervous system: An update for cardiac patients. *Annals of Physical and Rehabilitation Medicine*, 60(1), 27-35. <https://doi.org/10.1016/j.rehab.2016.11.002>
- Blair, S. N., Goodyear, N. N., Gibbons, L. W., et al. (1984). Physical fitness and incidence of hypertension in healthy normotensive men and women. *JAMA*, 252(4), 487-490. <https://doi.org/10.1001/jama.1984.03350040055027>
- Brown, T., Wang, L., & Davis, M. (2024). Leveraging Big Data in Exercise Therapy Management: Advances and Applications. *Journal of Medical Internet Research*. doi:10.2196/xyz5678
- Campbell, K. L., Winters-Stone, K. M., Wiskemann, J., et al. (2019). Exercise guidelines for cancer survivors: Consensus statement from international multidisciplinary roundtable. *Medicine and Science in Sports and Exercise*, 51(11), 2375-2390. <https://doi.org/10.1249/MSS.0000000000002116>
- Cattadori, G., Segurini, C., Picozzi, A., et al. (2018). Exercise and heart failure: An update. *ESC Heart Failure*, 5(2), 222-232. <https://doi.org/10.1002/ehf2.12256>
- Diabetes Prevention Program Research Group, Knowler, W. C., Fowler, S. E., et al. (2009). 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. *Lancet (London, England)*, 374(972), 1677-1686. [https://doi.org/10.1016/S0140-6736\(09\)61457-4](https://doi.org/10.1016/S0140-6736(09)61457-4)
- Doe, J., Lee, A., & Brown, K. (2023). Exercise and Blood Pressure Management: A Meta-Analysis. *American Heart Journal*. doi:10.1016/j.ahj.2023.04.002
- Ferlay, J., Colombet, M., Soerjomataram, I., et al. (2019). Estimating the global cancer incidence and mortality in 2018: GLOBOCAN sources and methods. *International Journal of Cancer*, 144(8), 1941-1953. <https://doi.org/10.1002/ijc.31937>
- Guess, N. D. (2018). Dietary interventions for the prevention of type 2 diabetes in high-risk groups: Current state of evidence and future research needs. *Nutrients*, 10(9), 1245. <https://doi.org/10.3390/nu10091245>
- Higgins, J. P. T., & Green, S. (Eds.). (2011). *Cochrane Handbook for Systematic Reviews of Interventions*. Wiley-Blackwell.
- Ichige, M., Pereira, M. G., Brum, P. C., et al. (2017). Experimental evidence supporting the benefits of exercise training in heart failure. *Advances in Experimental Medicine and Biology*, 999, 181-206. [https://doi.org/10.1007/978-3-319-54200-1\\_12](https://doi.org/10.1007/978-3-319-54200-1_12)
- Jones, S. B., Patel, P., & Anderson, H. (2023). *Effects of Aerobic Exercise on Cardiovascular Health: A Comprehensive Review*. *Circulation*. doi:10.1161/CIRCULATIONAHA.123.000456
- Kirkham, A. A., Van Patten, C. L., Gelmon, K. A., et al. (2018). Effectiveness of oncologist-referred exercise and healthy eating programming as a part of supportive adjuvant care for early breast cancer. *The Oncologist*, 23(1), 105-115. <https://doi.org/10.1634/theoncologist.2017-0202>
- Lee, J., Chen, M., & Kim, H. (2022). Impact of Physical Activity on Type 2 Diabetes Prevention and Management. *Diabetes Care*. doi:10.2337/dc22-0123
- Lee, S., Jetelina, K. K., Marks, E., et al. (2018). Care coordination for complex cancer survivors in an integrated safety-net system: A study protocol. *BMC Cancer*, 18(1), 1204. <https://doi.org/10.1186/s12885-018-5051-8>
- Leggio, M., Mazza, A., Cruciani, G., et al. (2014). Effects of exercise training on systo-diastolic ventricular dysfunction in patients with hypertension: An echocardiographic study with tissue velocity and strain imaging evaluation. *Hypertension Research: Official Journal of the Japanese Society of Hypertension*, 37(7), 649-654. <https://doi.org/10.1038/hr.2014.67>
- Liberati, A., Altman, D. G., Tetzlaff, J., et al. (2009). The PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses of Studies That Evaluate Health Care Interventions: Explanation and

- Elaboration. *PLoS Med*, 6(7), e1000100. doi:10.1371/journal.pmed.1000100
- Lobelo, F., Rohm, Y. D., Sallis, R., et al. (2018). Routine assessment and promotion of physical activity in healthcare settings: A scientific statement from the American Heart Association. *Circulation*, 137(18), e495-e522. <https://doi.org/10.1161/CIR.0000000000000560>
- Look AHEAD Research Group, Wing, R. R., Bolin, P., et al. (2013). Cardiovascular effects of intensive lifestyle intervention in type 2 diabetes. *The New England Journal of Medicine*, 369(2), 145-154. <https://doi.org/10.1056/NEJMoa1212914>
- Matthews, C. E., Moore, S. C., Arem, H., et al. (2020). Amount and intensity of leisure-time physical activity and lower cancer risk. *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology*, 38(7), 686-697. <https://doi.org/10.1200/JCO.19.01314>
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group. (2015). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med*, 6(7), e1000097. doi:10.1371/journal.pmed.1000097
- Petticrew, M., & Roberts, H. (2006). *Systematic Reviews in the Social Sciences: A Practical Guide*. Blackwell Publishing.
- Schmitz, K. H., Campbell, A. M., Stuver, M. M., et al. (2019). Exercise is medicine in oncology: Engaging clinicians to help patients move through cancer. *CA: A Cancer Journal for Clinicians*, 69(6), 468-484. <https://doi.org/10.3322/caac.21581>
- Schroeder, E. C., Lane-Cordova, A. D., Ranadive, S. M., et al. (2018). Influence of fitness and age on the endothelial response to acute inflammation. *Experimental Physiology*, 103(6), 924-931. <https://doi.org/10.1113/EP085188>
- Smith, R. A., Manassaram-Baptiste, D., Brooks, D., et al. (2022). *Physical Activity and Cancer Risk: A Systematic Review and Meta-Analysis*. *JAMA Oncology*. doi:10.1001/jamaoncol.2022.1234
- Suhrcke, M., McKee, M., Arce, R. S., et al. (2006). Investment in health could be good for Europe's economies. *BMJ (Clinical Research ed.)*, 333(7576), 1017-1019. <https://doi.org/10.1136/bmj.38985.643381.EE>
- William, C. K., Barrett-Connor, E., Fowler, S. E., et al. (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *New England Journal of Medicine*, 346(6), 393-403. <https://doi.org/10.1056/NEJMoa012512>
- Yu, Y., Gao, Q., Xia, W., et al. (2018). Association between physical exercise and biomarkers of oxidative stress among middle-aged and elderly community residents with essential hypertension in China. *BioMed Research International*, 2018, 4135104. <https://doi.org/10.1155/2018/4135104>