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# A review of cardiac rehabilitation and exercise in cardiovascular disease

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**Abstract**
**Aim:** The purpose of this article was to review the effects of cardiac rehabilitation and exercise on cardiovascular disease. Heart disease is one of the most common diseases in the world. There is a negative relationship between mortality and physical activity level in cardiac patients. Rehabilitation is an important and effective part of cardiac care which, in addition to controlling the disease, slows its progress and improves symptoms, Nowadays; modern science in the field of medical and therapeutic programs has made a great effort to perform the exercises in the form of cardiac rehabilitation programs under the supervision of specialist physiologists and exercise physiologists.
**Materials and methods:** Google Scholar, PubMed, Scopus databases were searched for articles.
**Results and Conclusion:** Performing cardiac rehabilitation activities by cardiac patients enables them to perform daily living tasks and exercise improves their functional ability, on the other hand, the rate of participation in a sports rehabilitation program is inversely proportional to mortality, and cardiac rehabilitation, along with regular exercise, plays a role in stopping the process of heart disease and reducing its associated symptoms and improving mental health and enhancing functional capacity and returning to life without dependence on others and most importantly reducing mortality. Determining the type, severity, frequency, necessity of monitoring sports rehabilitation specifically with regard to the symptoms shown by the patient improves high intensity exercise, cardiac function and athletic ability.

**Keywords:** Cardiac Rehabilitation, Exercise, Cardiovascular Disease


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## Introduction

According to the WHO definition, cardiac rehabilitation is: a set of measures needed to achieve the best possible physical, psychological and social conditions for heart patients to lead an active life. Unfortunately, many heart patients lack the physical strength or confidence to do their own thing. Cardiac rehabilitation is an important part of cardiac care today, in addition to controlling the course of the disease, it slows its progress and improves symptoms, and a comprehensive cardiac rehabilitation program includes improving health behaviors and modifying risk factors. In addition to exercise, these programs involve changing the pattern of nutritional, psychological, and social status (Pollock et al., 2000). Cardiovascular disease is one of the most important causes of mortality in developed countries and some developing countries; More than 6,000,000 Americans are affected each year and overall, 2.5 million people in the United States have heart disease (Qashqai et al., 2012). It is noteworthy that sedentary lifestyle has been identified as a risk factor by the American Heart Association. Unfortunately, approximately 70 percent of adults in the United States are sedentary and about half of young Americans have no regular physical activity. Such observations have been attributed to industrialization, automation, the presence of clients at home, and a decrease in leisure time physical activity (Cardiovascular and Lung Rehabilitation Organization, 2006). Exercise is a non-pharmacological intervention in cardiac rehabilitation. Peak VO2 is the most important predictor of mortality in cardiac patients (Sarhard et al., 2016). Exercise activity by cardiovascular patients increases their ability to perform daily tasks, increases their functional capacity and improves mortality by promoting quality of life (Shabani et al., 2010). Functional capacity is expressed as the maximum oxygen consumption of patients and is an important criterion for MET and is the unit of determination of cardiac patients' physical capacity (Ades, 2001). Exercise rehabilitation is effective in preventing or even reversing the functional, morphological, and structural changes of the heart, not only does it not damage the heart but it also improves these parameters (Szot et al., 2016). Unfortunately, despite the beneficial effects of sports rehabilitation, the participation rate of patients in these sessions is very low (10% -20%) (Layler et al., 2011). Given the prevalence of cardiovascular disease and its resulting mortality and major limitations in quality of life, leaving work and imposing enormous economic damages, causing mental problems and, most importantly, increasing the age of those suffering from the disease Heart disease and the increased risk of this disease in young people, Considering appropriate and cost-effective strategies and the effective role of sport rehabilitation activity and increased physical fitness in prevention, reduction of complications and severity of symptoms of this disease is suggested. The present article examines the scientific resources of athletic rehabilitation and

rehabilitation exercises in cardiovascular disease and the principles that should be followed in its administration.

**Methodology**

In this review study, 54 valid references from all studies, as well as reference books on cardiac rehabilitation and exercise physiology in scientific sites such as PubMed, Elsevier, Science Direct, Scopus, Google scholar and libraries that have been up-to-date and have a closer connection to the topic were selected and it has been searched and scrutinized, therefore, no time constraints were considered in the selection of articles.

**Results**

**History of cardiac rehabilitation**

Understanding the principles and goals of cardiac rehabilitation goes back to the 1950s and it was the start of rehabilitation exercises in 1960, which began four to six months after myocardial infarction with careful supervision. The earliest cardiac rehabilitation programs were limited to regular exercise, which slowed the progression of coronary risks. At the time, according to the American Heart Association, exercise was inappropriate for older patients. In 1960, researchers began hospital mobility studies after myocardial infarction (Thomas et al., 2007; Juliff et al., 2001) and the use of early motor protocols for patients after open surgery was also increased as a common practice. In the early 1970s, a large number of clinical groups underwent supervised rehabilitation exercises. This method was first implemented in Europe and subsequently in Canada and the US, Exercise was often associated with diet and smoking cessation to reduce coronary risks. During the 1980s, research showed that: Patients with coronary artery disease who received drug therapy such as beta-blockers and calcium-blockers and nitrates were able to practice more effectively through the rehabilitation exercise program. As well as a decrease in symptoms and improvement in functional capacity have also been the results of exercise (American Heart and Vascular Association, 2006). Patients undergoing open surgery or angioplasty in the late 1980s and early 1990s were also allowed to participate in cardiac rehabilitation programs. In 1990, there were significant changes in the clinical care practices of cardiovascular patients and the time of rehabilitation care for these patients (Thomas et al., 2007). Cardiac rehabilitation includes a set of medical procedures, exercise training, correction of cardiovascular risk factors, training and counseling. Designed to limit physiological and psychological factors, reduce the risk of heart attack and re-infarction, control of heart symptoms, reverse the process of atherosclerosis, and improve the social and occupational mental status of cardiac rehabilitation services (Goyle et al., 1999).

**Cardiac rehabilitation consists of four steps:**

**First step**

During hospitalization, a patient admitted to the hospital for reasons such as myocardial infarction, open surgery, angioplasty, angina, or emergency admission for heart disease or early diagnosis of heart failure. During this step, medical evaluation, education, correction of myths about the disease and the heart, risk factors, and mobility and dynamics are considered (American Society of Cardiovascular and Lung, 2006; Donker et al., 2000).

**Second step**

Immediately after the patient's discharge at this step, home examinations, telephone communication and guidance are performed through supervised instructions. These are supervised guidelines for the patient self-help program that have been effective in reducing anxiety and depression after a heart attack (American Cardiovascular and Lung Association, 2006; Dunker et al., 2000).

**Third step**

It is recommended to supervise exercise program, along with psychological support training and counseling on specific risk factors and individual training such as reducing misconceptions about illness and encouraging smoking cessation and controlling weight and returning to professional life and see a psychiatrist, cardiologist, or exercise physiologist (American Heart Association, 2006).

**Fourth step**

Doing physical activity for a long time is a lifestyle change.

**Ban on sports rehabilitation**

Absolute restriction of rehab includes angina, unstable, recent myocardial infarction, uncontrolled arrhythmia, severe aortic stenosis and heart disease, irreversible heart failure, severe myocarditis and pericarditis. Partial bans that temporarily stop athletic rehabilitation include tachycardia, Bradycardia, systolic blood pressure above 200 and diastolic levels above 110 mm Hg, electrolyte abnormalities and severe anemia.

**The effect of exercise on the cardiac**

Daily exercise can reduce your heart's need for oxygen and nutrients. There are many mechanisms involved in improving oxidative metabolism and increasing exercise endurance, these include decreased catecholamines, increased gas exchange capacity and reduced lactate accumulation, improved endothelial function of vessels, and increased capacity for oxidative metabolism by the heart muscle (Ellard et al., 1992). Exercise as a preventive method, by modifying risk factors, can dramatically decrease mortality from heart disease. Aerobic exercise has been shown to decrease the expression of receptors involved in activating the intracellular inflammatory pathway in cardiac protection (preventing coronary artery obstruction) (Riahi et al., 2015 and 2016). Increased blood flow to the coronary arteries and intensification of oxygen extraction in the skeletal muscles decrease cardiac output (O'Connor et al., 1989). Malfunction of the autonomic system (sympathetic / parasympathetic imbalance) is a major cause of heart disease and sudden death, the sports rehabilitation program improves the performance of the autonomic system. Even abnormalities in ventricular polarization that lead to poor ventricular function and sudden death are reduced by performing exercise rehabilitation (Pollock et al., 2000; Levy et al., 2011). Aerobic exercise increases cardiac output and reduces resting heart rate (Duckey et al., 2016). Samavati Sharif et al stated in a study that: Many dangerous diseases of adulthood are rooted in adolescence and concluded that all three types of exercise (endurance, strength and speed) reduce some of the cardiovascular risk factors in adolescent soccer; However, each of these exercises has its own benefits (Samawati Sharif et al., 2018).

Regular exercise with atherogenesis (enlargement and remodeling of the cardiac arteries) and angiogenesis (growth and growth of capillaries) increases blood supply to the heart. In patients with ST coronary heart disease, exercise activity leads to decreased segmental depression, indicating a decrease in vascular resistance leading to increased blood supply to ischemic sites (Levy et al., 2011). The benefits of exercise include increased endurance, reduced daily fatigue, increased workouts, reduced heart rate, decreased blood pressure (heart oxygen demand), reduction of dyspnea, reduction of heart fatigue (poor cardiac function after prolonged endurance exercise despite absence of disease) (Whitey et al., 2000) and reduction of atherogenic and thrombogenic factors. Increased blood concentration due to coronary artery disease decreases with exercise. Exercise reduces the risk of cardiac arrhythmias by improving endothelial function, reducing platelet adhesion and balancing the autonomic system. Physical activity not only prevents hypertension but also reduces it in people with hypertension and slows or even reverses the progression of coronary atherosclerosis and reduces mortality (Pollack et al., 2000).

**Effect of exercise on cardiac disease prevention:**

In healthy people, increased cardiopulmonary readiness is associated with a significant decrease in mortality. Evidence shows that exercise increases the cardio-respiratory fitness of men and women of all ages from childhood to adulthood and the amount of physical activity is directly related to health (Pollack et al., 2000). Exercise increases physical strength due to the increased ability to use oxygen to generate energy, maximize cardiac output, and release oxygen from the capillaries. Aerobic exercise reduces myocardial oxygen demand and thereby reduces the likelihood of cardiac ischemia (Whitey et al., 2000). Exercise Increases Lipo-Protein Lipase Activity in Fat and Muscle Tissue, Lipase Reduction, and Liver Cholesterol Stress Transfer Activity Leads to Lower LDL-C and Blood Cholesterol and by increasing the clearance of low-density lipoproteins and chylomicrons, it reduces triglycerides and increases -HDL C. Improvement in lipoprotein profile is directly related to physical activity but not related to exercise intensity. Aerobic exercise reduces the occurrence of lethal arrhythmias by modulating sympathetic / para-sympathetic activity (Reese et al., 2000). Exercise is used as part of rehabilitation programs to increase muscle strength and increase aerobic capacity (Saeedi et al., 2005).

**Exercise and cardiac disease**

The rate of mobility in people with chronic heart disease such as stroke and heart failure is 40% -30% lower than healthy individuals (Tsai et al., 2006). Even exercise for as little as 1-3 months has a positive effect on their quality of life (Tsai et al., 2006). The type of exercise also influences the rate of recovery of heart patients (Niobi et al., 2000).

Both heavy and light exercise is useful in patients with left ventricular failure who regularly participate in rehabilitation and enhances functional capability (Liu et al., 2016). For those who are sedentary, exercise is ideal for a quick and regular walk which increases lipid profile in addition to increasing fitness, which improves lipid profile in addition to increasing fitness (Tsai et al., 2006). Studies show that every 1 mL / kg / min maximal increase in oxygen consumption is associated with a 15% reduction and every 1 MET is associated with a 43% reduction in cardiac deaths (Nampson et al., 2000). The severity of heart disease determines the amount of monitoring during exercise (Gobel et al., 2000).

**General principles of prescribing exercise in the prevention of cardiac disease**

A. Prescribing exercise in the absence of ischemia or arrhythmia (low risk group): In this group, the intensity of exercise is approximately 50% -80% VO2max. People who are less physically fit should start exercising with less intensity. If the patient is willing to walk, exercise can be done on a treadmill with a specific heart rate. To determine the severity of exercise, patients should be instructed on how to use the RPE criterion. The target is to reach the threshold of 13-13 Borg pressure, which is equal to the average intensity or MHR of 75% -60%. Exercise volume is increased to 5 minutes per week after a healthy and safe range is determined. Once the patient has sufficient physical fitness, then resistance exercise can be included in the exercise program.

B. Exercise with Ischemia or Arrhythmia (Moderate to Severe Risk Group): In these people, exercise should be done under medical supervision, exercise stress testing is necessary to determine a healthy range of cardiac activity. There is less exercise intensity in this group and using the maximum heart rate is wrong. The purpose of medical supervision is to familiarize patients with physical activity and to encourage concerned patients to investigate possible problems (such as chest pain, heart failure, and arrhythmia). Patients are regularly reevaluated so that they can perform physical activity at home or in a group setting after being recovered and placed in a lower risk group (Gillaria et al., 2006). Physical activity begins at the end of the recovery period and mostly involves aerobic exercise such as hiking, biking (American Heart Association, 2006). In cardiac patients, it is best to perform aerobic exercise with a high intensity of 15-13 bp in the first few weeks. Then add resistance training. Each exercise session begins with a 10-minute warm-up, during which light exercises and stretching exercises are performed to gradually increase the heart rate while preventing muscle damage. Stretching exercises in an exercise program increase range of motion and flexibility. The warm-up phase of the lateral vessels opens the heart and reduces peripheral vascular resistance. Exercise activity can be continuous or intermittent with rest between workouts, which generally lasts 20-30 minutes. The cooling phase involves stretching activities that prevent rapid blood pressure lowering and reduce joint pain and prevent ventricular arrhythmias (common in coronary patients at the end of exercise). The duration of the exercise depends on one's fitness. For sick and weak patients, each training session is 5 to 3 minutes, increasing gradually over 12 to 4 weeks. The duration of the sport rehabilitation is 3-12 months.RPE is a common way to control the intensity of exercise in people with arrhythmia or those taking beta-blockers. Since the maximum heart rate is not detectable in these subjects, RPE is commonly used to increase RPE as heart rate increases (Jahan et al., 2009).

**Cardiac disease and resistance exercise**

In the early years, most aerobic rehabilitation exercises were performed but later resistance training was added, studies have emphasized the need for resistance training in these patients (Karlostodir et al., 2002). Since 1980, resistance exercise has been considered part of a sports rehabilitation program and many articles have been published regarding its safety (McCartney et al., 2006). In the last two decades, resistance exercise has been proven safe in heart patients and it has even been reported that cardiac ischemia is less prevalent during walking than cycling (cycling) and cycling (Noss et al., 2009). Cardiac patients need a minimum amount of resistance exercise to perform their daily activities. Resistance exercise increases Muscle Strength and Strength and Self-Confidence (American Cardiovascular Society, 2006). Resistance exercise complements the beneficial effect of aerobic exercise in coronary artery disease. Because while aerobic exercise modulates cardiac risk factors, resistance exercises increases muscle strength and volume (Ventura et al., 2007). Some studies find resistance training to be more effective in improving functional capacity and improving quality of life than aerobic training (Thiobi et al., 2000). But others believe that aerobic and resistance exercises exacerbate each other's effects, and resistance exercise will increase performance capacity compared to endurance training (Kamps et al., 2008). Until recently, weight-bearing exercise was prohibited in cardiac patients but a study in a small group of coronary patients found that; This exercise is healthy and useful and improves the functionality of patients and has a beneficial effect on cardiovascular risk factors. This type of exercise is recommended in asymptomatic or mild symptoms after a period of aerobic exercise but the maximum weight should not exceed 60% 1RM and the volume of exercise should be adjusted according to the patient's wish (Jahan et al., 2009). In order to avoid Valsalva maneuvers, patients should be instructed on how to lift weights correctly to control blood pressure and the result of a double heart rate (oxygen consumption index) (Noss et al., 2009). Exercise with low resistance and high repetition reduces the likelihood of imprisonment due to the need for less effort (Stackey et al., 2010). A major concern in resistance exercise is hypertension. Hypertension in resistance exercise depends on controllable factors such as

the intensity of the load and the amount of muscle mass being exercised and the number of repetitions and the duration of exercise. Measurement of intra-arterial blood pressure in cardiac patients showed that in resistance exercise with intensity of 40-60% maximal voluntary contraction and 10-15 repetition rate of hypertension. Endurance exercise is not different from moderate intensity exercise (Karlostodir et al., 2007). There is no increase in low and moderate intensity resistance exercise with proper breathing and avoidance of the Valsalva maneuver but at 1 RM 100%-80% hypertension was observed. Resistance exercise in patients with controlled hypertension is unobstructed (Stake et al., 2010). Prescribing resistance exercise depends on the patient's clinical condition and its potential complications. Good to moderate left ventricular function, good cardiac function, absence of angina pectoralis, and absence of reverse ST fragment are essential for this (Carlostodir et al., 2007).

**Cardiac disease and aerobic exercise**

Aerobic exercise improves both mobility and cardiopulmonary fitness in stroke patients. Physical fitness exercises increase the strength of legs and walking distance in people with myocardial infarction and improve daily activity (Mako et al., 2005). A volume of aerobic exercise equivalent to 1,000 kcal a week is moderate enough to reduce mortality by 30% -20%. 1000 kcal equals 30 minutes of moderate-intensity aerobic activity most or all days of the week. Aerobic activity not only includes walking, running, cycling and boating but also regular daily activities such as walking, climbing stairs and doing daily activities. Workloads should be distributed between exercise sessions to consume 1000 kcal per week. The more calories you consume, the more beneficial the effects of exercise (American Cardiovascular Society, 2006).

**Cardiac disease and periodic exercise**

Nowadays, it is believed that periodic exercise is more effective than endurance in patients with enduring physical condition and the extent of its effect depends heavily on exercise. Even in patients with heart failure, a periodic exercise session of up to 30 minutes after exercise is observed to increase the ejection fraction and decrease vascular resistance (Thomszak et al., 2011). One week of intermittent exercise reduces the volume of strokes during exercise to 30%, the ejection fraction to 31%, and the systemic vascular resistance to 33% (Haykoxy et al., 2012). High-intensity intermittent exercise increases the VO2 peak despite moderate risk of continuing moderate-intensity exercise (Sherhard et al., 2016). In patients with heart failure, periodic exercise has a greater effect on increased VO2 max than continuous exercise (Wieselff et al., 2007). Prior to starting treatment, all patients with heart failure should undergo cardiopulmonary testing and be monitored at all training sessions (Haykoks et al., 2013).

**Cardiac disease and aerobic and resistance exercise**

The cardiac rehabilitation program includes aerobic and resistance exercise. Endurance and resistance exercise are more effective than endurance exercise alone in improving body composition and increasing physical strength (Juliff et al., 2001). Combining aerobic exercise with resistance to increased left ventricular volume, left ventricular diastolic function index and arterial function and have a significant effect on arterial dilatation, systolic pressure, and diastolic function of the left ventricle and improve quality of life (Wiself et al., 2007).

**Risk of exercise in cardiac patients**

Studies reported 1 case of cardiac arrest for 112,000 hours, 1 case of acute stroke for 300,000 hours, and 1 case of death for 800,000 hours of exercise rehabilitation (Levy et al., 2011). Cardiovascular events rarely occur in low and medium intensity (Rogenmo et al., 2012). Patient classification helps reduce risk (Lyon et al., 2005).

**Discussion**

Studies show that exercise plays an important role in controlling and preventing the progression of heart disease. Even a small amount of physical activity can help these patients live independent lives. All types of exercise play a role in athletic rehabilitation but this effect varies with the type and intensity of exercise. High-intensity exercise improves cardiac function and exercise endurance and reduces the incidence of angina and ST segment depression (Warburton et al., 2005). High-intensity intermittent exercise increases the VO2 peak despite moderate risk of continuing moderate-intensity exercise (Sherhard et al., 2016). Exercise with HR peak intensity of 95% -85% is more effective than HR peak 70% -60%. Given the effectiveness of high-intensity exercise, such exercises are recommended for cardiac rehabilitation (Rogenmo et al., 2012). In the early years, most of the exercises were aerobic rehabilitation, but later resistance training was added. Aerobic exercise improves both mobility and cardio-respiratory fitness and daily activity in patients and effectively modulates cardiac risk factors. Strength training increases muscle strength and volume, it reduces the heart's need for oxygen during exercise. Today, it is believed that if the patient is in a stable physical state, intermittent exercise has a greater effect on increasing VO2 max than continuing exercise and the extent of the effect is strongly dependent on exercise (Lloyd et al., 2002). 16 weeks of exercise that included 10 minutes warm-up and 30 minutes of continuous exercise with 65% heart rate reserve and resistance training and finally 10 minutes of cooling, compared to the intermittent exercise that included warming up then 2 minutes of vigorous exercise with 90% rhythm intensity and 2 minutes recovery with 40% rhythm intensity and cooling made a similar improvement in fitness. Intense intermittent exercise seems to be more effective in athletic rehabilitation and is less risky than moderate-intensity continuous exercise (Haykowski et al., 2007). Another reason for the discrepancy in the results of the reports may be related to the timing of rehabilitation exercise. The timing of the onset of exercise rehabilitation plays a role in the patient's response to exercise, although not recommended in specific time studies but athletic rehabilitation usually begins 4-8 weeks after discharge (Warburton et al. 2005). Given the impact of exercise on muscles, the positive effects of exercise on cardiac rehabilitation appear to be related to improved athletic fitness and environmental mechanisms such as muscle function (Haykowski et al., 2007). One of the causes of early fatigue and disability in cardiac patients is the pathological and metabolic changes of the muscle fibers. Exercise improves these effects. Exercise regeneration enhances one's functional capacity by activating physiological mechanisms such as greater oxygen uptake of blood, increased oxidative reaction efficiency, and increased cardiac output (Hanson et al., 1987). In women over 65 years of age with congestive heart failure, 10 weeks of resistance exercise three times a week prevents skeletal muscle myopathy caused by heart failure and increased the strength, endurance, and number of type I muscle fibers (Ellard & Larson, 1992). Increased functional ability after exercise rehabilitation may also be related to noncardiac factors such as improved oxidative and glycolytic function of the muscle cell and better oxygen depletion of the capillaries and improved vascular function (Smart et al., 2007). Activities that increase aerobic capacity have specific characteristics, including: alternating muscle relaxation and relaxation, especially large muscle groups, these exercises are known as endurance and cardiovascular activities. In the early stages of the exercise program, walking has more benefits than other exercises (McClowe et al., 1990). Studies of heart patients and healthy people have shown that: Rapid walking on a flat surface has a significant effect on gaining

training intensity up to 70% of maximal heart rate (Pollack et al., 2000). In cardiac patients, prolonged hospitalization or inactivity may decrease muscle mass, which reverses these effects of aerobic endurance training, increase the heart's endurance against load pressures and because it increases the number of mitochondria and oxidative capacity, it reduces inflammation. Another effect of aerobic exercise is to increase blood volume, thereby increasing the volume of cardiac output and cardiac output and increasing blood distribution capacity in active muscles (Ding Wall et al., 2006). Studies have shown that when patients perform aerobic exercise several times a week, the size of the heart becomes significantly smaller and pumps blood better. Aerobic exercise reduces productive pressure (heart rate, systolic blood pressure) in patients, it also reduces ventilation during exercise and lowers blood lactate levels and reduces fatigue. On the other hand we can say that: Maximum oxygen consumption, which is one of the best methods for measuring exercise capacity in heart patients, Regular aerobic exercise increases the rate of 16 to 29 percent in the elderly (Qashqai et al., 2012). Studies examining exercise in patients with heart disease suggest that: Regular aerobic exercise is not only safe but can significantly improve your lifestyle (Mako et al., 2005). High-intensity exercise improves cardiac function and athletic ability. The type, severity, frequency, necessity of monitoring the fitness of the sport is specifically determined according to the patient's symptoms (Riahi, 2016). Resistance exercises increase endurance and muscle strength (Fontes Carvalho et al., 2015). The benefits of strength training include the following:

- ✓ Increase in maximal muscle strength and endurance by 50% or more of training volume (Pollack et al., 2000).
- ✓ Improvement or delay in reducing bone mineral density or content (Tong et al., 2016).
- ✓ Increase in maximal training capacity, sub-maximal endurance and pressure perception during heavy sub-maximal exercise (Pina et al., 2003).
- ✓ Reduction of arterial pressure while increasing training muscle length (Pollack et al., 2000).
- ✓ Improvements in tasks, especially in hand and foot ability (Fontes Carvalho et al., 2015).
- ✓ Improvement in quality of life parameters such as depression and anxiety, mental distress, fatigue and weakness, and emotional states (Anderson et al., 2016).

On the other hand, it should be noted that: Resistance exercises can be effective, safe and effective in improving cardiovascular function, modifying risk factors, and providing well-being for coronary artery disease patients and because increased muscle mass is associated with increased basal metabolic rate and increased energy return, it can decrease or stabilize body weight and reduce fatigue. They are therefore complementary to aerobic exercise (Karros et al., 2015).

**Conclusion**

Overall, it is concluded that exercise rehabilitation leads to a significant reduction in deaths and complications from heart disease. The type, intensity, and timing of the exercise are important factors that determine the extent of the effect of exercise rehabilitation. It is advisable to begin physical rehabilitation immediately after the patient's physical condition has been established and in the exercise protocol to get the most out of a combination of aerobic, resistance, and intense exercise. The frequency, duration and necessity of monitoring sessions are specifically determined by the severity of the symptoms and the patient's condition and given the advantages mentioned in doing aerobics and resistance exercises, it can be concluded that spending a cardiac rehabilitation program in addition to providing lateral adjustments can be effective in reducing the risk factors of the disease, to enable cardiovascular patients to live faster and to perform daily activities without dependence on others.

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