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Effectiveness of Physical Exercise and Diet in Heart Failure Patients

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ABSTRACT

Introduction: Heart failure is a pathological condition in which the heart's organs no longer have the ability to pump blood to the ventricles and throughout the body. One of the leading causes of morbidity and mortality is heart failure. Functional capacity and patient quality of life are correlated in patients with heart failure. Exercise and diet can be used to increase functional capacity. The purpose of this study was to identify the effectiveness of exercise and diet as treatment modalities, to improve patient well-being and quality of life outcomes.

Methods: This article employs the evidence-based practice of physical exercise (exercise) and a comprehensive diet offered to heart failure as part of a literature review methodology. Journal articles that meet the requirement of 12 were included in this article. While articles that are inappropriate or only abstract did not include in this study.

Result: Twelve articles were included in the study. The suggested physical activity, such as walking, can be completed in 6 minutes or for 30 minutes over the course of a week, three times. And a 30-minute riding session is possible. The DASH diet is advised, and patients should receive the recommended amount of sodium (1500 mg/day).

Conclusion: Physical exercise and a comprehensive diet that can be done well in heart failure patients on a regular and regular basis can help patients to reduce the risk of developing symptoms that can trigger the severity of heart failure. Moreover, patients can carry out daily activities and can do their jobs well and can improve their quality of life even better.

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1. INTRODUCTION

Heart failure is a pathological condition in which the heart organ no longer can pump blood to the ventricles and throughout the body (Kurmani & Squire, 2017). The most common cause of heart failure is decreased myocardial function. In addition, the cause of heart failure is damage to the heart muscle due to acute or chronic ischemic conditions experienced by the patient, hypertension due to increased vascular resistance, ventricular remodeling, and increased hemodynamic load of the heart (Inamdar & Inamdar, 2016). Heart failure is a major health problem of cardiovascular disease in the community. This condition is a major cause of morbidity and mortality, despite many advances in the management of patients with heart failure (Jones, Hobbs, & Taylor, 2017).

Heart failure is a major public health problem with a current prevalence of more than 5.8 million in the United States and more than 23 million worldwide. Every year in the US, more than 550,000 people are diagnosed with heart failure for the first time (Groenewegen, Rutten, Mosterd, & Hoes, 2020). The prevalence of heart failure in Southeast Asia is 3 times compared to European and American countries, which is 4.5–6.7%: 0.5–2% (Lam, 2015). While in

Indonesia alone the prevalence of heart failure reached 11.34% of cases. Data from Riskesdas reports that more than 75% of heart failure occurs in the elderly due to complications from hypertension, coronary heart disease, and a history of smoking (Nurhayati, Andari, Fredrika, Wijaya, & Yanti, 2022).

Functional capacity in heart failure patients can be related to the patient's quality of life. Functional capacity can be done through physical exercise and diet. Exercise-based rehabilitation programs and a healthy diet have been reported to have beneficial effects on patients with heart failure (Amiya & Taya, 2018). Exercise and diet are additional non-pharmacological treatment modalities performed by patients with heart failure. Sports training can minimize symptoms, improve quality of life and train exercise tolerance by moving the limbs (De Maeyer, Beckers, Vrints, & Conraads, 2013). Dietary interventions can have a positive impact on heart failure patients. Research reports that have been carried out state that comprehensive nutrition and physical exercise interventions can synergistically impact the pathophysiology and symptoms of heart failure to improve patient outcomes and quality of life (Wickman et al., 2021).

Management in heart failure patients can be given by regular physical activity is beneficial for heart health. Frequent exercise is associated with reduced cardiovascular mortality and the risk of developing cardiovascular disease (Nystoriak & Bhatnagar, 2018). Nurses in providing health education to heart failure patients always teach about the importance of physical exercise activities and the fulfillment of diet every day (Pi & Hu, 2016). Restriction of sodium consumption is the most common non-pharmacological strategy in the diet in heart failure patients (Allen, Billingsley, & Carbone, 2020). Nurses can provide good and optimal nursing interventions that can be started when the patient is hospitalized, the patient can perform physical exercise and a comprehensive diet (Moertl et al., 2017). The author is very interested in providing information related to physical exercise (exercise) and diet that can be done for patients suffering from heart failure.

2. METHOD

This article uses a literature review method using the evidence-based practice of physical exercise (exercise) and a comprehensive diet given to heart failure patients to improve the patient's quality of life. The literature evaluation of this article uses the PICOS method. The next stage Is collecting the data and literature for doing the review by using searching methods “AND” and “OR” in each key. The analysis

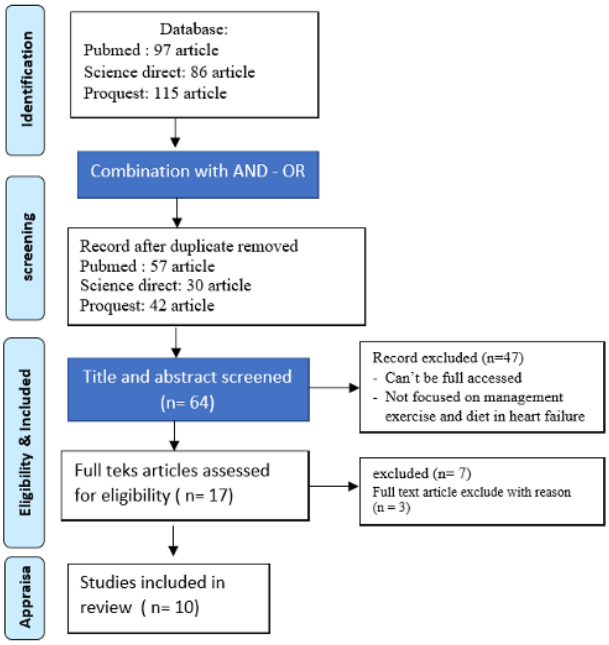

Figure 1. Framework Search Literatur Review adapted From PRISMA

was carried out using the Pubmed, Proquest, and Science Direct databases. The literature review stage is using prisma diagrams including the identification of literature, screening, the selection of the literature, and determining the criteria of inclusion and exclusion (Figure. 1). The last stage in the literature review is doing in synthesis of the literature to get the literature review.

3. RESULT

Heart failure with a high prevalence rate makes researchers always develop evidence-based practice to improve the quality of life of patients. The results of research conducted by researchers can be applied to patients in the hope of helping patients. Research on physical exercise and a comprehensive diet in patients with heart failure are listed in Table 1.

4. DISCUSSION

Heart failure is a cardiovascular disease that often occurs because its incidence continues to increase and has a high mortality rate. Heart failure is associated with various complications in which patients often experience shortness of breath, arrhythmias, myocardial infarction, cardiomyopathy, and fatigue (Choi, Park, & Youn, 2019). Other complications that often occur and are experienced by patients are swelling of the ankles, an increase in the jugular veins, and the presence of edema in the lungs which can cause rales (Schwinger, 2021). Clinical severity in heart failure patients is assessed based on clinical signs and symptoms that appear, so many patients will experience a decrease in active

range of motion, which can interfere with the course of daily activities (Chaudhry & Stewart, 2016).

Management in providing care to patients with heart failure is given to improve the patient's quality of life. The therapeutic management given is seen from the severity of clinical signs and symptoms experienced by the patient. When patients have acute heart failure, the primary focus of providing therapeutic interventions in improving hemodynamic status through increased preload and afterload and cardiac contractility (LaMonte, 2018). Initial management and treatment goals in patients with heart failure, both acute and chronic, focus on modifying risk factors that can be carried out for patients, one of which is changes in diet and lifestyle, such as a comprehensive diet that includes sodium intake restriction, regulation of food consumption and exercise as an alternative. choices that can be made by patients according to the condition of the severity of signs and symptoms experienced by patients with heart failure (Aggarwal et al., 2018). Exercise is an important additional non-pharmacological treatment modality for patients with heart failure that has been shown to have a positive effect on mortality, morbidity, exercise capacity, and quality of life. Different training modalities are available to target the problems facing heart failure patients. It is very important to adjust the prescribed exercise regimen so that efficiency and safety are well guaranteed (De Maeyer et al., 2013).

In the European Society of Cardiology (ESC) heart failure guidelines, patients with heart failure are recommended to perform exercise training properly (Cattadori, Segurini, Picozzi, Padeletti, & Anzà, 2018). The results of the objective evaluation stated that it was very important to implement a proper physical exercise program in patients with heart failure. Physical exercise is highly recommended in patients with heart failure. Physical exercise programs with exercise are beneficial for heart failure patients and have become an important component of rehabilitation therapy (Giallauria, Smart, Cittadini, & Vigorito, 2016).

Physical exercise modality therapy in cardiac rehabilitation by doing regular exercise has a beneficial effect on the quality of life. This effect is very useful for increasing activity capacity in patients (Taylor et al., 2019). The increase in exercise capacity of heart failure patients undergoing continuous aerobic exercise is mainly determined by the total energy expenditure, such as the product of exercise intensity, session duration, session frequency, and program duration of the training program (Ponikowski et al., 2016). According to Suharsono (2013) physical exercise that can be done by the patient is doing aerobics in the form of walking. Walking can be done by patients with a duration of 30 minutes for 1 month and can be done with a frequency of 3 times a week. Meanwhile, according to research journals that have beenDu, Wonggom, Tongpeth, and Clark (2017), walking exercises can also be done for 6 minutes or can be called the Six-Minute Walk Test which is one of the efforts to increase physical activity and quality of life of heart failure patients. Walking exercises can be used as a tool for measuring the functional status of patients, especially in cases of advanced disease with multiple comorbidities that cannot perform more complex exercise tests (Du et al., 2017). This exercise can be performed indoors, on straight corridors, or on flat and hard surfaces that are usually at least 30 meters in length. Patients were told to calm down, take medication and wear comfortable clothing and shoes. This exercise is the gold standard or what is often called the golden hours for assessing functional capacity, because this exercise can provide information about the patient's daily activities and short-term prognosis, especially in patients with heart failure (Giannitsi et al., 2019).

Exercise programs for patients with CVD have traditionally involved mostly continuous aerobic exercise of low to moderate intensity, with the consensus that one of the benefits of aerobic exercise is an increase in peak oxygen uptake (Gonçalves, Raimundo, Abreu, & Bravo, 2021). Another exercise that patients with heart failure can do consists of 8 weeks of aerobic and gym-based strengthening exercises 3 times a week(Hayes, Leet, Bradley, & Holland, 2012). This exercise is usually done on a treadmill or by cycling. According to Passino et al. (2016), the training program consists of cycling, which is done for a minimum of 3 days per week, 30 minutes per day. Another physical exercise that the patient can do is knee extensor exercises, which were performed on 1 leg and resulted in a significant increase in VO2 performed for 2 months (Fleg et al., 2015). Physical exercise with regular exercise carried out by heart failure patients has a good impact. The impact that contributes to the patient's health is the increased capacity to carry out activities of daily living. Patients will not feel short of breath when carrying out their activities, and it will also affect a better quality of life.

A lot of patients with heart failure take part in physical exercises such as leisurely walks, taking part in cardio exercises. Controlling the frequency and duration of exercise, fatigue, and exercise intolerance makes it difficult for heart failure patients to continue

exercising. Research that has been carried out suggests that for heart disease patients who are less fit or at high risk it is recommended to start with aerobic exercise or walking of minimal duration continuously and gradually increase the intensity of an exercise program (Guo et al., 2021). Non-adherence to the use of physical exercise is influenced by patients who do not comply with the program and cannot maintain the program properly (Morris & Chen, 2019). Lack of physical exercise that can worsen the incidence of heart failure is related to patient non-adherence, resulting in an effect of improving the prognosis of heart failure in these patients (Cao et al., 2018).

Many heart failure patients in Indonesia have implemented physical exercise by following cardio exercise, leisurely walks, and cycling. Patients perform these activities on average every day. The advantages of physical exercise are that it can help patients increase their activities, and can reduce shortness of breath when patients are used to doing physical exercise. This should also be in line with the patient's diet because a comprehensive diet can also support patients in preventing recurrence and severity of heart failure patients. Based on the results of research that has been carried out, the main priority of food consumption to reduce the risk of CHF is to increase the consumption of whole grains, fruits, vegetables, nuts, and fish (Bechthold et al., 2019). This is in line with research conducted by Abu-Sawwa et al., (2019) which states that Dietary recommendations used for heart failure patients with hypertension can use the DASH diet that emphasizes the intake of fruits and vegetables, lean protein, fish and nuts, fiber and whole grains and low-fat dairy products to maintain macronutrient levels that can lower blood pressure (Abu-Sawwa et al., 2019).

Effective evidence-based interventions for the prevention and management of HF are needed to improve patient longevity, symptom control, and quality of life. Dietary Approaches to Stop Hypertension (DASH) dietary intervention can have a positive impact on heart failure patients(Dinu et al., 2017). Improving medical nutrition therapy through a precision nutrition approach has the potential to reduce the burden of heart failure, improve clinical care, and meet the diverse needs of patients (Wickman et al., 2021).

The role of the DASH diet given to patients in the management of heart failure can increase the patient's physical and functional capacity by decreasing blood pressure, body weight, and MSM cholesterol concentration and improving heart function, exercise capacity, and improving the patient's quality of life. Positive effects of the DASH diet adopted by patients as part of a comprehensive treatment plan to reduce risk and disease management and monitoring can contribute to improved health outcomes (Wickman et al., 2021).

The results of several studies listed in the table and recommendations from the American Heart Association (AHA) state that the DASH diet is efficacious for reducing the risk of CHF and is a healthy dietary pattern that has been supported (Krist et al., 2020). The DASH diet is one of several included in the recommendations for dietary patterns that can help adults need to lower low-density lipoprotein (LDL-C) cholesterol and blood pressure. In addition to the consumption of foods prescribed in the DASH diet, nutritional care is an integral part of comprehensive CHF management. Apart from following the DASH diet, patients can also restrict sodium and fluids (Salehi-Abargouei, Maghsoudi, Shirani, & Azadbakht, 2013). There are three different levels of sodium assigned to the diet based on typical US sodium consumption (3450 mg/day), the upper limit of recommended sodium intake at the time of the study (2300 mg/day), and the potentially optimal level of sodium intake (1500 mg/day)(Van Horn et al., 2016).

When combining a low sodium intake of 1500 mg/day with a DASH diet compared with a high sodium intake of 3450 mg/day from a control diet, the results demonstrated a reduction of 7.1 mmHg for individuals without hypertension and 11.5 mmHg in patients with hypertension (Vest et al., 2019). Meanwhile, according to research Abu-Sawwa et al., (2019) state that, Sodium restriction in the heart failure diet is very important, as it is the basis of heart failure self-care management. Intake recommendations vary widely from 3000 to 400 mg/day as recommended by the American College of Cardiology, to less than 2000 mg/day in moderate to severe congestive heart failure. In addition, the AHA also recommends limiting sodium intake to a more stringent comprehensive diet of 1500 mg/day (Abu-Sawwa et al., 2019).

A daily sodium restriction of 1.5g/day is a potential barrier to achieving adherence to a low sodium intake. Low and tight sodium restriction may contribute to cardiac performance in patients who have had compensated CHF (Vest et al., 2019). This can be an evaluation for patients who run this diet program for a better quality of life and to prevent the severity of heart failure suffered by the patient.

CONCLUSION

Physical exercise and a comprehensive diet are beneficial for heart failure patient. These exercises can be done routinely to increase activity capacity and improve the patient's quality of life. Physical exercise can be done on patients who have implementation guidelines such as how to do physical exercise, frequency, duration, and benefits that are useful for patients. In addition, the patient's recommendations for the DASH diet and strict sodium restriction can be implemented immediately.

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APPENDIX

Table. 1 Studies Result Related to Physical Exercise in Heart Failure Patients

Researcher	Results
SuharsonoYetti & Sukmarini (2013)	The condition of patients with heart failure affects daily activities. This study identified the impact of Home Based Exercise Training (HBET), using 23 respondents divided into 11 in the control group and 12 in the intervention group. The measurement results found a significant difference in functional capacity in the two groups. HBET is used as a therapeutic modality for nurses in managing patients.
Pi, Hong Ying, & Hu, Xin. (2016)	The journal states that regular physical exercise such as aerobics can improve exercise capacity and heart systolic function in heart failure patients. However, there are new modalities of therapy that can be performed in patients with*high-intensity aerobic interval exercise (HIIE).*In recent times Tai Chi, a form of low-intensity physical activity that originated in China. positive effects of Tai Chi on balance control, flexibility, cardiovascular fitness, pain, fatigue, and insomnia, as well as on psychological well-being, reduction of stress, anxiety, and depression.
Chen, Yan-Wen, et al (2018)	Physical exercise and cardiac output have a major impact and influence on the patient's quality of life. Cardiac rehabilitation carried out at home can significantly improve activity tolerance and oxygen absorption. Patients divided into 2 groups in the intervention group received outpatient cardiac rehabilitation for 1 week. The intervention group was to perform aerobic exercise at least 3 times per week, for a duration of at least 30 minutes each time.
Long, et al 2019	The study was conducted with 5783 participants with heart failure. The main results in this article mention the effect of rehabilitation provided by nurses on exercise with long-term physical exercise in heart failure patients. Physical exercise performed by the patient affects the reduction in mortality
Li, Jiahui, et al (2019)	Chronic heart failure patients who were given rehabilitation therapy with physical exercise had a significant improvement in exercise capacity, quality of life and a reduction in hospitalizations. Patients were given supervised training consisting of 12 training sessions that were always monitored and 3 sessions per 1 week which were run for 4 weeks. After that the patient continued regular physical exercise 5 times per week for 8 weeks. The primary outcome was an increase in exercise capacity as measured by peak oxygen uptake (VO2).
Pandey, et al (2015)	This article reviews changes in physical fitness in the elderly that are not carried out routinely and are at risk of recurrence in heart failure patients. The average fitness of heart failure patients at the age of 49 years by doing a treadmill. The 73,439 participants at CCLS who underwent a complete clinical examination at the Cooper Clinic in Dallas, 24,872 were eligible. The results of the study state that fitness in the elderly after the age of more than 65 years is very at risk for repeated hospitalization with cases of heart failure
Mudge, et al (2018)	Patients with heart failure are given physical exercise by being monitored by nurses. The results of these exercises are very effective and feasible as a physical exercise program that can be done at home in heart failure patients
Oliveira, et al (2018)	Exercise exercise in patients with heart failure can improve functional capacity. 6MWT was performed on day 1 and day 10 in hospitalized patients with heart failure. Aerobics is the choice of exercise in the article. The results prove that physical exercise can reduce shortness of breath and longer quality of life.
(Abu-Sawwa, Dunbar, Quyyumi, & Sattler, 2019)	Sodium restriction in the heart failure diet is very important, as it is the basis of heart failure self-care management. Intake recommendations vary widely from 3000 to 400 mg/day as recommended by the American College of Cardiology, to less than 2000 mg/day in moderate to severe congestive heart failure. In addition, the AHA also recommends limiting sodium intake in a stricter comprehensive diet of 1500 mg/day. While the dietary recommendations used for heart failure patients with hypertension can use the DASH diet which emphasizes the intake of fruits and vegetables, lean protein, fish and nuts. , fiber and whole grains and low-fat dairy products to maintain levels of macronutrients that can lower blood pressure.
(Eilat-Adar, Sinai, Yosefy, & Henkin, 2013)	Lifestyle factors, including nutrition, play an important role in the etiology of cardiovascular disease. In this study, nutritional information is divided into three main parts, namely diet patterns, individual foods and nutritional supplements. The dietary patterns reviewed included a low-carbohydrate diet, a low-fat diet, a Mediterranean diet and the DASH diet. Foods reviewed in this study included: whole grains and dietary fiber, vegetables and fruits, nuts, soy, dairy products, garlic and eggs. While those reviewed are salt and sodium as well as omega - 3 and fish oil.
(Wang, 2019)	This study reports that in dietary compliance in heart failure patients recommend five main dietary patterns. A plant-based diet is indicated by a high intake of fruit, vegetables, fish, animal protein and low-fat dairy products, these conditions are associated with a lower risk of heart failure. On the other hand, patients who consume red meat and processed foods, sugary drinks, high-fat milk and whole grains, this is referred to as a southern or sour diet, show an increased risk of heart failure.
(Dinu, Pagliai, & Sofi, 2017)	A heart-healthy diet should maximize consumption of whole grains, vegetables, fruits and nuts, avoiding consumption of meat and meat products and processed foods. The plant-based diet fully meets the criteria and the results of the study show that the Mediterranean and vegetarian diets are gaining great interest in being used by patients to meet the dietary patterns of heart failure patients.