SCIENCE SET
OPEN ACCESS PUBLISHERS

Research Article

Science Set Journal of Cardiology Research

Potential of Resistance Exercise in Improving the Lives of Patients with Heart Failure: Research Proposal

Ahmed Lateef Alkhaqani*

M.Sc., Ministry of Health, Al-Najaf Direction, Al-Sadder Medical Hospital, Al-Najaf, Iraq

***Corresponding author:** Ahmed Lateef Alkhaqani, M.Sc., Ministry of Health, Al-Najaf Direction, Al-Sadder Medical Hospital, Al-Najaf, Iraq.

Submitted: 04 Feb 2023 **Accepted:** 12 Feb 2023 **Published:** 16 Feb 2023

Citation: *Ahmed Lateef Alkhaqani (2023). Potential of Resistance Exercise in Improving the Lives of Patients with Heart Failure: Research Proposal. Sci Set J of Cardiology Res, 2 (1), 01-10.*

Abstract

Background: *With the increase in the number of heart failure patients, debilitating conditions of muscle willing and atrophy and numerous health problems associated with heart failure have become the most significant concerns. Exercise and physiotherapy are considered important contributions to the rehabilitation of patients with heart failure.*

The study aims to determine the effectiveness of resistance exercise on physical performance and activities of daily living among patients with heart failure.

Methodology: *randomized controlled trial study design will be conducted at Al-Najaf city in the southern region of Iraq and carried out on 68 patients with heart failure for at least six months and who had a medically stable condition, which will be randomly divided into training group; exercise therapy and control, groups. The training group participated in 8-week (3 sessions per week) resistance exercise therapy in three sets of 10 repetitions of knee extension, hip flexion, and hip abduction with the use of an elastic band under the supervision of a training physiotherapist and researcher during the first hour of the three routine heart failure treatment session per week. But the control group did not experience any intervention. To analyze the data, two-way analysis of variance and Bonferroni statistical tests will be used at the significant level of (P = 0.05).*

Discussion: *Important features of this study include the randomization procedures, double-blind, large sample size, and a standardized protocol for resistance exercise training on the physical performance of heart failure patients. This study aims to determine the effectiveness of resistance exercise for patients with heart failure. Therefore, our results will be useful for patients with chronic heart failure, medical staff, and healthcare decision-makers.*

Keywords: Resistance Exercise; Physical Performance; Heart Failure; Activities of Daily Living

Background

Chronic heart failure (CHF) is a general medical problem worldwide. It is one of the most common causes of disease and death worldwide, especially in developing countries, as a global public health problem. Moreover, heart failure (HF) is a progressive and unpredictable condition resulting from structural or functional defects in cardiac tissue. It induces breathlessness, exhaustion, and a decreased desire to exercise due to the heart's failure to supply enough blood to fulfill the body's physiological needs. However, the life expectancy of patients with CHF is improving; many of these rehabilitated years are spent dealing with the crippling effects of symptoms, a growing number of hospitalizations, and poor prognosis [1].

According to the American Heart Association (AHA), rehabilitation programs are a safe and successful method for improving the quality of life in people with HF. Furthermore, the importance of exercise training programs in individuals with HF can translate into better clinical outcomes, such as improved vascular function, health-related quality of life, and functional class. As well as a lower risk of death or hospitalization. In adults, exercise intolerance is the primary symptom that is associated with HF, which is the diminished ability to perform activities involving large skeletal muscles because of symptoms of dyspnea or fatigue; however, aerobic exercise, resistance training, or both in the presence of HF has multiple physiological benefits, including improvements in overall function, ventilatory parameters, as well as muscle and endothelial function [2].

According to the World Health Organization (WHO) report, "physical inactivity is already a major global health risk and prevalent in both industrialized and developing countries, causing approximately 5.2 million deaths. Physical inactivity is the primary cause of most chronic diseases, and it is one of four main risk factors of CHF". In today's world, physical activity is very important. Exercise keeps the body strong and healthy. Therefore, increased physical activity is essential to preventing and managing. The National Institute for Health and Care Excellence "NICE" in guidelines on adults recommends: Encouraging people with CHF to take exercise, achieve a healthy weight,

and stop smoking. The American National Kidney Foundation [ANKF] guidelines include an encouraging statement about exercise, weight loss, and smoking cessation in CHF. Physical activity promotes various metabolic benefits that can reduce the long-term risk of the progression of kidney dysfunction [3]. As patients with heart failure are prone to muscle loss and weakness, physical function preservation is of particular importance and appropriate exercise, therefore, has the potential for reduced morbidity and associated cost savings [4]. Patients with heart failure suffer from deteriorating physical health impaired physical function, and have a low quality of life, explained by insufficient metabolic clearance. To overcome these obstacles, cost-effective strategies must be developed, including exercise complementing heart failure therapy.

Study significant

The problem can prevent patients from carrying out daily activities. As a result, low physical performance is the most common complication of chronic heart failure. Low physical activity and disability are associated with a greater risk of disability and death. In addition, patients with CHF on maintenance HD suffer from a progressive deterioration of impaired physical function, which is associated with increased mortality and morbidity and decreased quality of life and leads to decreased physical activity of patients [5]. Patients' quality of life with heart failure can be affected by social factors causing major changes in the life of patients with CHF and clinical changes caused by the disease and its complications. Information on this subject can therefore help to identify risky patients. The decrease in hemolysis patients' life expectancy can affect various aspects of their lives. Impaired quality of life can change the patient's functional status from a physical perspective. So that the patients' daily physical activity is disrupted, and their ability to perform daily activities is decreased. Changes in lifestyles and limitations have influenced and impacted patients and their families, ultimately reducing their quality of life.

Globally, cardiovascular disease is the leading cause of mortality. Every year, an estimated 17 million people die from heart disease, responsible for roughly one-third of all deaths worldwide. By 2030, it is predicted that 23.6 million people will have died as a result of heart disease around the world. In developed countries, the disease's burden is a severe concern. According to the latest WHO data published in 2018, coronary heart disease deaths in Iraq reached 23,463, or 18.92% of total deaths. The age-adjusted death rate is 230.27 per 100,000 of the population, ranking Iraq 20 in the world.

Chronic heart failure is common, affecting about 900.000 people in the United Kingdom and with a prevalence of about 6-10% in people aged over 65 years. Despite significant advancements in diagnosing and treating many cardiovascular diseases over the last three decades, heart failure is becoming more common. Indeed, effective treatment of congenital, valvular, and coronary disease, hypertension, and arrhythmias can come at the cost of heart failure. Although the morbidity and mortality rates in patients with this condition have significantly improved, they are often associated with myocardial injury, leading to heart failure if left untreated.

Heart failure is now considered a global problem in the 21st century, with a growing effect on healthcare systems. Both industrialized and developing countries are seeing an increase in the prevalence of (HF). According to the American Heart Association (AHA), about one in every five people over the age of 40 has HF, and about 4.9 million individuals in the United States have congestive heart failure.

Several organizations, including the American Heart Association (AHA), The American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR), and the Agency for Health Care Policy and Research, agree that a comprehensive cardiac rehabilitation program should contain specific core components. These components should optimize cardiovascular risk reduction, reduce disability, encourage active and healthy lifestyle changes, and help maintain those healthy habits after rehabilitation is complete. Despite this, exercise programs are not commonly implemented in many countries due to many existing barriers healthcare professionals face when proposing an exercise intervention. These barriers include lack of knowledge, fear of injury or medical complications, fatigue, or simply a lack of motivation by the patient and the healthcare professional. Many studies focus on overcoming these barriers. For example, nurse-led exercise interventions have been proven efficient in physically impaired populations, such as the elderly, and complex ambulatory or diabetic patients. In studies involving CHF patients, these interventions have also improved clinical outcomes and reduced hospitalization rates. Although it is increasingly recognized that physical activity needs to be promoted, the existing evidence base for the cost-effectiveness of relevant interventions appears to be weak and dispersed. This experimental study will contribute to the important topic in medical studies to fill and address the literature gap. This study aimed to evaluate the physical performance and physical activity of patients with heart failure and to determine the effectiveness of exercise training in improving the physical performance and activities of daily living of patients with heart failure.

Patients require structured care to regain their quality of life and preserve or enhance their functional ability after an acute incident or chronic heart condition. They may need therapy to avoid a recurrence of the occurrence by following a drug regimen and leading a healthier lifestyle. Cardiac rehabilitation is categorized as the clinical application of preventive care using a multidisciplinary, coordinated approach for comprehensive risk reduction and long-term care of cardiac patients. Nurses play a crucial role in providing patients and their families with education and preparing the former for post-discharge management of their disease. Several evidence-based educational topics and nursing-care performance measures should be considered when managing HF: managing and recognizing symptoms, monitoring weight, diet, level of activity, medication, and follow-up appointments. To adequately educate patients about self-care, then improve their quality of life. Exercise training is an important component of the rehabilitation program's healthy lifestyle. Running, biking, swimming, and even walking can provide people with various health benefits that can last their entire lives. Consistent resistance exercise improves cardiovascular health and performance and can help build stronger bones, improve sleep, and even extend life.

Resistance exercise training as a rehabilitation

Resistance training (also referred to as strength training or weight training) progressively uses different loads, movements, and speeds to improve muscles' strength, strength, and resistance. Resistance exercise is one of the modalities of exercise chosen for physical conditioning. The process of post-injury rehabilitation is shifting from preventive prevention by resistance training to preventive prevention of injury [6]. The American Diabetes Association, 2014 reported that lifestyle modifications (such as diet and exercise) were associated with a greater decrease in blood sugar control compared to medication emphasizing resistance exercise training [7]. Evidence: There are various guidelines (mainly the American Heart Association and the American College of Sport and Medicine) for describing resistance exercise training in healthy populations and populations with different co-morbidities and different age groups [8]. Evidence suggests that resistance training is more important in improving functional mobility than resistance training for older adults [7].

Study hypothesis: Patients who attend resistance exercise programs exhibit better physical performance and function than before.

Method

Study Design: The experimental design (Randomized Controlled Trial) will be implemented in the study by which the patients will assign randomly into two groups (study and control groups). The study's setting will be taking place in Al-Najaf Al-Ashraf City/Al-Najaf Health Directorate / Al-Sadder Medical City/ Al-Najaf Cardiac Center

Ethical Considerations

This is one of the essential issues in nursing research before collecting data to preserve the principles of ethics; the goal is to insure the rights of the researcher and participants. The researcher has insured the ethical considerations according to the Belmont Report (ethical principles and guidelines for the protection of human subjects of research) that was written and published in 1978 by the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. Today, the Belmont Report is an important document for medical research. This document aims to protect the rights of the subject in clinical trials. These rights are protected by using the three ethical principles of respect, justice, and goodwill. The researcher protects these rights and takes measures to protect all patients participating in the current clinical trials. The administrative agreements and ethical considerations involve official permissions are obtained from

Faculty of Nursing / University of Kufa to accept the study proposal, another permission is obtained from the University of Kufa / College of Medicine-Medical Ethical Committee. Before gathering the data, this is one of the most basic principles to protect the participant's values and dignity. Ministry of Planning/ Central Council for Statistics to accept the study instrument.
The researcher obtained approval from the designer of the short physical performance battery (SPPB) scale via E-mail to use in the current study. Another permission is obtained from the patients themselves after the researcher explains the study's purpose and provides the participants with confidentiality as well as voluntary cooperation according to the subject's agreement sheet. Before participation, patients are oriented to the study and obtain informed consent in a written consent form. The subjects' agreement sheet is formed according to scientific resources guidelines, such as

The researcher is chosen this center for the following reasons: They are teaching center with accessible services to patients with renal disease; This center receives all adult patients with heart failure who attend the clinics for treatment and follow-up; This center facilitates obtaining a large number of patients within a limited time which can helpfully represent the target population.

Study population: All the patients are heart failure in Al-Najaf city.

Participants Selection: According to the American Society of cardiology clinical practice guidelines for diagnosis [9], 68 patients volunteers eligible will be recruited to participate in the study who were admitted there during the study period (34 participants will be selected purposively from center, Al-Sadder Medical City / Heart Center).

Randomization (Groups Assignment): 63 patient samples will be randomly divided into two groups. The study group consists of 32 patients who the researcher will expose to resistance exercise training programs. The group that didn't expose to the resistance exercise training program by the researcher is the control group, consisting of 31 patients.

After the initial assessment, the randomly assigned patient is executed using a random number list generated by the computer via (an Excel table) researcher is prepared to eliminate bias in intervention tasks. The study adheres to the procedures for maintaining the separation of the study and the control group. To avoid contact, patients were assigned to each group every week. See participant's flowchart1.

Blinding: The researcher uses the double-blinded technique in the present study, and it's used between the investigator and the patients for the data collection outcomes. Therefore, the participants and researcher do not know the study and control groups. In addition, both the study and the control group were treated equally after it was randomly assigned (administering the data collection instruments and ethical protocol except for the intervention).

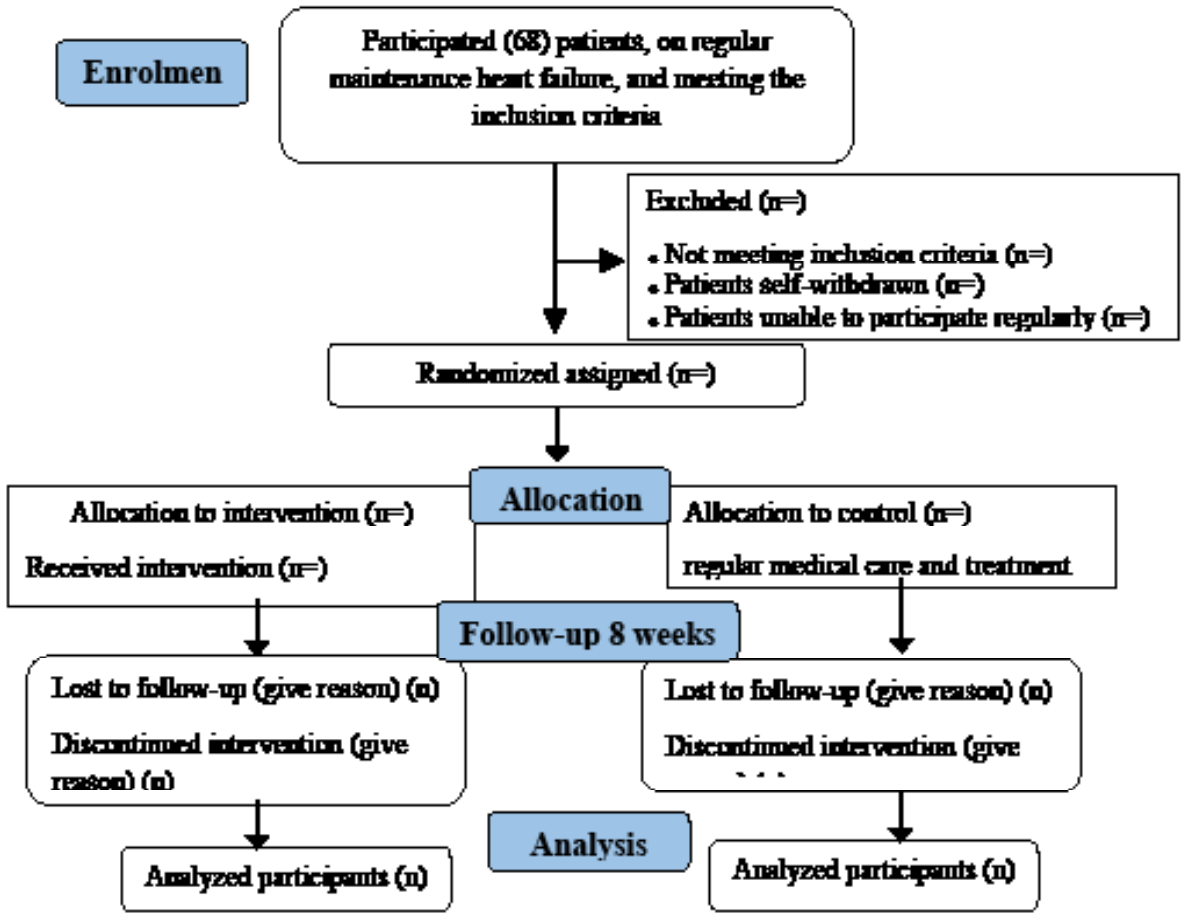

Figure 1: Participant's flowchart

Sample of the Study: A non-probability (purposive sample) technique selected from patients with heart failure will be included in the present study. All patients visiting the Al-Sadder Medical City / Cardiac Center are diagnosed with heart failure. The sample will be assigned randomly into study and control groups. This study sample will be selected based on the following criteria:

- All participants receive more than two sessions a week because rehabilitation programs cannot be used for patients receiving less than two sessions a week. In addition, it lacks to show progress in physical performance due to the time spacing between sessions, that be according to policy and rules of the Oklahoma Health Care Authority (OHCA).
- The participants are between 20 years and older; the present study focused on adult patients, and CHF most commonly occurs in adult patients compared to young patients.
- All participants are of Iraqi Nationality to facilitate the communication.
- Alert patients and free from changes in consciousness level because studies require subjective measurement.
- Patients who are free from psychiatric disorders because the researcher needs to explain and clarify the steps of participation in the program; it depends on the patient's cooperation.
- Participants who are with heart failure for at least six months; and are medically stable; in order to avoid complications.
- Patients are able to carry out the exercise.
- Exclusion Criteria: Patients with heart failure have absolute contraindications to exercise tests. These conditions include:
- Lower-extremity fracture or amputation.
- Patients with limitations in walking ability.
- Mechanical disorders associated with pain (such as lumbar disk or lumbar spondylosis).
- Cerebral vascular diseases manifested as transient ischemic attacks.
- Chronic lung diseases result in significant oxygen desaturation during exercise or pulmonary congestion; the program's application requires patients' compliance and may cause fatigue.
- To avoid vascular access failure and complication, patients with vascular access in a lower extremity (femoral catheter).

Inclusion and exclusion criteria are listed based on methodological and scientific research considerations for managing the possible external variables that may affect the study results. Moreover, the Cardiologist's suggestions were also considered when the researcher selected these criteria to make the study program application appropriate and harmless.

Study procedures: All participants underwent the same evalu-

ation and battery of tests; after a proper explanation of the test procedure, they were fully aware of the study's goals and procedures, they agreed to participate in the current study, and they signed written informed consent at the beginning of this study, according to the ethical principles and guidelines for the protection of human subjects and approved by the institutional ethics committee of Faculty of Nursing, Kufa University.

Study Instrument: The researcher adopted the instrument of study based on the previous scientific kinds of academic literatures to investigate the study phenomenon. The questionnaire is related to the patients' physical performance, the checklist of physiological parameters, and complications. The final copy consists of the following:
Part I: Socio-demographic Characteristics: This part involves socio-demographic data obtained from the patient's heart failure using an interview. This part comprised (6) items, which included age, gender, body mass index, level of education, occupational status, and socioeconomic status (monthly income). Weight and height will be assessed by a portable stadiometer (Detecto's ProMed 6129 medical scale, 203 E. Daugherty, Webb City, MO, USA).

Part II: Clinical Characteristics: The second part of the questionnaire concerns collecting clinical characteristics. Data will be obtained from the patient's heart failure through the interview. This part comprises two subparts, which include past and present medical history and clinical assessment.

Past history: Completely describing of the complaint will be determined, and information on the patient's medical history will be collected to provide necessary background information such as (diabetic Mellitus, coronary artery disease, hypertension, and others).

Present history: Investigated present medical history to elicit information about the presenting complaint. The present history form has chronic heart failure-related problems and complications such as (anaemia, etc.).

Part III: Evaluation of Physical Performance by (Short Physical Performance Battery) Tool: There are many tools and approaches used to assess physical performance, such as (Fried's criteria, Reuben "physical performance test", and the Frailty index). But the researcher was chosen the short physical performance battery (SPPB) scale as a measure of performance based on physical ability because it has many advantages:

- Completed in just a few minutes, the training required for administration was minimal, and the use of simple equipment was needed.
- In addition, results can be quantified by points and can be reproduced and adapted to the changes in functionality over time.
- The short physical performance battery can be safely used to evaluate functional capacity in outpatient and clinical settings.
- It can be useful in identifying activities of daily living (ADLs).
- It also predicts the risk of disability in older chronic disease patients hospitalized.
- The short physical performance battery tool is an objective measurement.

Jack Guralnik and colleagues developed the scale in 1994 as part of a National Institute on Aging project, the Established Populations for Epidemiologic Studies of the Elderly (EPESE). It has been used in large-scale epidemiological studies and, as such, has an excellent normative basis. The short physical performance battery is a well-established instrument for measuring physical performance, commonly used among community-dwelling adults, nursing home residents, and hospitalized patients [10]. The SPPB is an objective measure and a validated and reliable assessment tool for measuring lower extremity function that is widely used in both clinical and research settings. The SPPB comprises three parts: the balance test, the gait speed test, and the chair stand test [11]. Can be shown clearly in (figure 2).

Part IV: Katz Index of Independence in Activities of Daily Living (ADL): Normal aging changes and health problems frequently show themselves as declines in the functional status of older adults. Decline may place the older adult on a spiral of iatrogenesis, leading to further health problems. One of the best ways to evaluate the health status of older adults is through functional assessment, which provides objective data that may indicate future decline or improvement in health status, allowing the nurse to intervene appropriately.

The Katz Index of Independence in Activities of Daily Living, commonly referred to as the Katz ADL, is the most appropriate instrument to assess functional status as a measurement of the client's ability to independently perform activities of daily living. Clinicians typically use the tool to detect problems in daily living activities and plan care accordingly. The Index ranks adequacy of performance in the six functions of bathing, dressing, toileting, transferring, continence, and feeding. Clients are scored yes/no for independence in each of the six functions. A score of 6 indicates the full function, 4 indicates moderate impairment, and 2 or less indicates severe functional impairment. The instrument is most effectively used among older adults in various care settings when baseline measurements, taken when the client is well, are compared to periodic or subsequent measures [12].

Validity and reliability: In the thirty-five years since the instrument was developed, it has been modified and simplified, and different approaches to scoring have been used. However, it has consistently demonstrated its utility in evaluating the functional status of the elderly population. Although no formal reliability and validity reports could be found in the literature, the tool is used extensively to flag signaling older adults' functional capabilities in clinical and home environments.

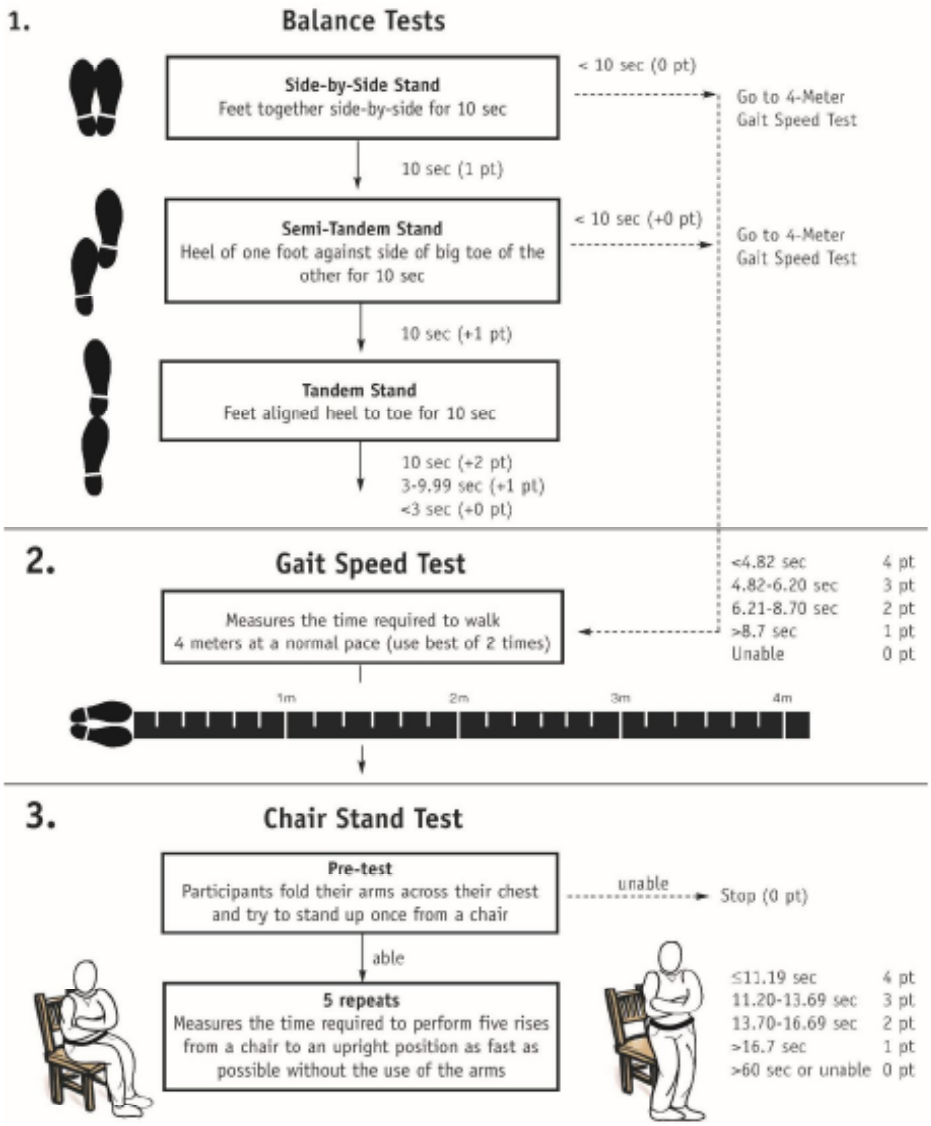

Figure 2: Flowchart for the SPPB (Guralnik et al., 2000)

Study Instrument Validity: The validity of an instrument concerns its ability to gather the data it intends to gather. The face validity of the nursing intervention program and the study instrument is determined through the use of a panel of (30) experts who have more than ten years of experience in their scientific field to review the nursing intervention program for it's content, instrument, and investigation clarity, relevancy, and adequacy of the questionnaire to measure the concepts of interest. Moreover, an expert's mean years of experience is (21.2) years. Some demographic and clinical items were deleted after a face-to-face or by e-mail discussion with each expert. After considering all the comments and recommendations of experts, the instrument will consider valid.

Method of Data Collection: The researcher will collect the data using the developed questionnaire and the structured interview technique with the subjects, who were individually interviewed using the questionnaire. The researcher will utilize face-to-face interviews for the sociodemographic and clinical data. Regarding the physical performance evaluation, the researcher will use the guided observation technique to evaluate the patients' physical performance through the short physical performance battery (SPPB) scale before and after the program's application. The researcher assessed physiological parameters using the hospital tools to measure blood pressure (evaluated from the non-fistula arm) and checked heart rate, respiratory rate, and oxygen saturation by portable pulse oximeter for each patient to insure the standardization of these tools following established guidelines. Regarding the evaluation of the physical performance after the application of the SPPB for the study group, the researcher will use two evaluation periods (after eight weeks of the program application) while the following established guidelines closely monitor the patients. For the control group, the researcher will use a pre-test and two post-test evaluations without applying the resistance exercises training, and they still receive management routinely.

Materials will be used to collect objective data: the researcher will use the following materials in the present study: (a chair; stopwatch; stethoscope; portable stadiometer; sphygmomanom-

eter; portable pulse oximeter fingertip; resistance elastic bands loop exercises; short physical performance battery test mobile application). These tools and devices will be used from the hospital; that is, they had calibrated, except SPPB, which is adapted to be valid and reliable tools.

Primary outcome measures: Outcome measures assessed change from baseline at eight weeks for the following: Short Physical Performance Battery (SPPB): A combination of physical tests that assess balance, gait speed, and lower limb functional strength that total score ranging from (0 worst to 12 best), each test was scored on a scale of (0 to 4 points) with using cut point criteria as follows: (0-6 points) low performance, (7-9 points) intermediate performance, and (10-12 points) high performance. Short physical performance battery are widely used both in the clinical and research environment. It is also a validated low extremity function measurement for patients and predicts disability and mortality.

Secondary outcome measures: Sit-to-stand-to-sit 10 and 60 tests (STS): Used for resistance and strength assessment, respectively, of the lower limbs' muscle capacity force. STS-10 is calculated as the total time needed to complete 10 consecutive repetitions of standing up and sitting down again, whereas the STS-60 registers the number of repetitions performed in 60 seconds. This test is easy, inexpensive, fast, and reproducible, and is used in the test pack for renal diseases. The STS10 and STS-60 have been found to be valid measures of lower body muscle endurance force. The 6MWT is an indicator of the participant's functional capacity, and it registers the maximum number of meters the participant is able to walk in a 30-m distance corridor. The 6MWT is a simple, valid tool for testing the ability to perform daily life activities, e.g., walking. And Physical Activity Scale for the Elderly (PASE) addressed the participant's physical activity level.

Statistical Analysis: Before statistical analysis, all continuous variables will be tested for statistical normal distribution using bar charts, the normal distribution curve, and the Shapiro-Wilk test. The following approaches to statistical data analysis will be used to analyze study data by applying Microsoft Excel (2016) and Statistical Package for the Social Sciences (SPSS) version 26. The analysis included two types of statistics; Descriptive Data Analysis: presented as Tables: Percentages, Frequencies, and Graphic presentation by using (Statistical figures). Statistical mean and standard deviation. Inferential Data Analysis: Statistical tests will be applied according to the distribution and type of variables. These will be used to accept or reject the null hypothesis, which includes the following:

An independent sample t-test will use to compare the means difference between two independent samples (study and control groups) to assess whether statistical evidence exists that the related population results vary significantly. The researcher will use paired t-test to determine the mean difference between the pre-test and post-test for the study and control groups. Will use a one-way Analysis of Variance (ANOVA) for pre-test and post-test1, and post-test2 for each group of physical performance outcome scores; a repeated measures analysis supplemented this. A Chi-square test will be used to compare frequencies for the goodness of fit and find out the association between different variables.

In the present study, the researcher will be depended on the confidence interval (0.99) to determine whether there will be a considered significant difference or correlation for the effectiveness of the program, while the (0.95) confidence interval will be used to investigate the effect of socio-demographic data and clinical characteristics on the implementation of the program.

Application of the intervention program

Steps of application to the program:

Because the program is designed within the conduct of nursing, its application has done theory the Nursing process as follows:

1. **Nursing Assessment:** This phase includes assessing the patient for demographic and clinical data about the End-stage heart failure patients' physical activity through the physical performance that will be collected by the short physical performance battery (SPPB) test before the application of the program
2. **Nursing Diagnosis:** In this phase determines, the following nursing diagnosis according to the data collected during the assessment step; the nursing diagnosis is (Impaired physical performance related to manifested by ( ) scores).
3. **Nursing Planning:** According to the nursing diagnosis, the nurse should use the resistance exercise training program (Knee extension, Hip abduction, and Hip Flexion with Resistance Bands) as a physical rehabilitation technique plan.
4. **Nursing Implementation:** implementation of a nursing care plan. Application of the designed program directly to the patients after the ethical considerations are achieved. Nurse will be using the resistance exercise training program for the patients to enhance their ability to physically performance it under the supervision of the researcher.

The implementation process involved the application of the resistance exercises training program according to the following procedure:

- Assessment of physical performance by short physical performance battery: The SPPB test is divided into three parts: assessment of the balance test consisting of three subtests, a gait speed test, and the chair stand test. These subtests are to be conducted sequentially.
- The researcher simulates the resistance exercise training to the patients to enhance their ability to perform it. And the patients perform the resistance exercise under the researcher's supervision.
- The researcher explains how the patients perform resistance exercise training later for follow-up. The patient can perform the exercise ranging from 3-10 times, with no medical limitation.
- A point system in which higher numbers mean the better output is chosen, with a maximum of 4 points to be obtained in each subtest. To go on to the next subtest, this limit must be reached.
- To achieve the full score of 4 points, patients need to complete all the repetitions successfully in the subtest. In total, 12 points are the highest score a patient can obtain, which

denotes high physical performance.

Explanation of resistance exercise:

A well-rounded fitness program includes strength training to improve joint function, bone density, muscle, tendon, and ligament strength, as well as resistance exercises to improve heart and lung fitness, flexibility, and balance exercises [14]. Resistance training is based on the principle that the body's muscles work to overcome resistance forces when necessary [15]. The physiotherapist must ensure that the suggested exercises be individualized to the CHF patient's current stage of physical ability to be done twice or thrice per week. Resistance strength will be set based on the Borg rating of perceived exertion, and rating 13 (somewhat hard) will be set as the targeted strength [15]. Proper breathing techniques will be emphasized during all exercises to avoid the Valsalva maneuver, as previous research recommends [16]. Training protocols consist of two sets of 10 repetitions of three resistance training types for lower extremities.: knee extension, hip abduction, and hip flexion using an elastic band (TheraBand Resistance Band Loops, THERABAND, Ohio, USA) encircling both ankles or above the knees, in a sitting or supine position depending on patient preference or ability for three sessions per week.

Knee extension (leg extension): sit in a chair or supine position. Put one end of the resistance tape on your right knee and secure the other end on your left leg. Lift and put your right leg on the right, and hold it for a few seconds. Lower your knee. Repeat using your left leg. 8 to 10 times with each leg. You should feel all the muscles in the front of your thigh working. It will feel harder the higher you lift your foot [17]. Compensation: If the band is slipping, pull the band away from your ankle and cross the bands to form a loop. Put your toes through the loop to secure the band to your ankle [18].

Figure 2: Knee extension with Resistance Band

Hip abduction: sit in a chair or supine position, depending on patient preference or ability. Wrap the resistance bands around the knees or ankles, extending the hip width of the knees. Slowly push your knees to the side, then return them to control and keep your feet together. Hold and slowly return. Repeat 8 to 10 times.

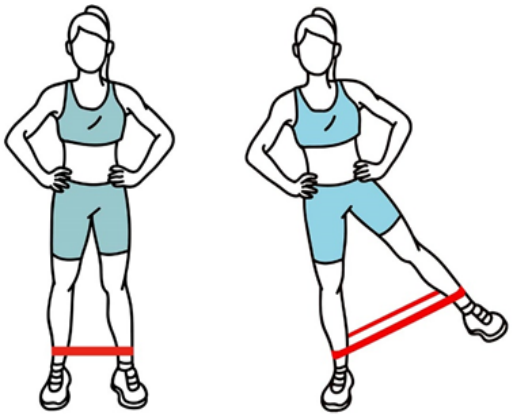

Figure 3: Hip abduction with Resistance Band

Hip flexion: To flex your knee, wrap the resistance band at the end of one end around your right ankle and the knee at the end, then wrap the other end on your left ankle. Your right foot will be slightly elevated from the ground, the right knee will bend, and you will be able to move toward your stomach. Extend the right knee to the starting position. Repeat the exercise with the left leg when you finish the number of exercises on the right leg. Repeat 8 to 10 times.

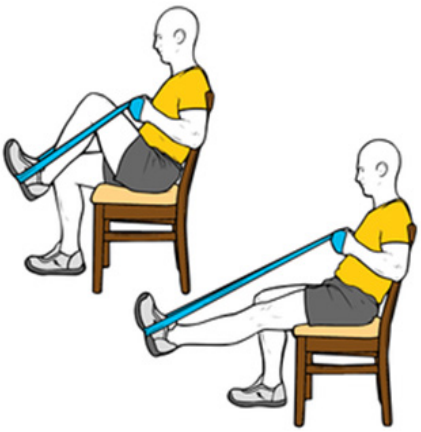

Figure 4: Supine hip Flexion with Resistance Band

Progression was performed by increasing contraction time up to 6 seconds, and patients performed 1 set of 10 repetitions. As recommended by previous research, a proper breathing technique was emphasized during all exercises to avoid the Valsalva manoeuvre.

5. Evaluation: This process involved a re-assessment of the patients' physical performance using the scale and then comparing the scores of the physical performance ability after the program's application with the scores collected in the pre-test, which was determined through the assessment step before the application of the program.

Discussion

Low physical performance is a common complication associated with CHF; low physical performance and impairment are associated with elevated risks of disability and death. In addition, this concept has been expanded further to show that CHF

is also associated with weak functional status. Physical activity is an important part of healthy lifestyles for all adults, especially the elderly. Most physical activity guidelines emphasize a 75-minute-a-week exercise to reduce the risk of chronic diseases. However, new evidence suggests that resistance training can effectively reduce the risk of many chronic diseases. This study aims to study the effectiveness of resistance training in the physical performance of patients with heart failure. The theory of resistance exercise training should be an effective treatment for chronic heart failure. However, the evidence of resistance exercise training is inadequate, and the effect of resistance exercise training exercise is disputed for chronic heart failure. The researcher will perform a prospective, double-blind, randomized controlled trial of resistance exercise training for patients with heart failure. Resistance exercise training could produce more beneficial effects than general exercise for patients with heart failure, reducing fatigue and improving function and quality of life.

Strengths and limitations

First, most previous resistance training studies were usually between several weeks and eight weeks. The study duration is an intervention period of 8 weeks and a follow-up period (with no active intervention) of 8 weeks, giving a total study period of 4 months. Second, in the present study, the intervention group performed three movements with resistance exercise, but the control group did not receive the exercise. On this basis, the study may reduce other prejudices compared to previous studies. Thirdly, earlier studies focused primarily on disabilities and quality of life. But physical performance is rarely analyzed for resistance exercise training on chronic heart failure. There are also some limitations to this study, and the total number of participants is not large (68 patients).

Moreover, only one exercise frequency is used to estimate the effect of resistance exercise training for patients, and different exercise frequency groups should be added to subsequent studies. Despite the well-known benefits, several barriers exist to implementing exercise routines within heart failure care. The current study may encounter some limitations, such as patients dropping out before the study is completed; perhaps, researchers cannot contact them regularly or are unaware of the factors of patient and comorbidity that may interfere with the study. Longer follow-up is needed to determine if these results will be interpreted into decreased death rates. Future research will attempt to overcome these limitations.

Finally, this study aims to determine the impact of resistance training on chronic heart failure patients and estimate whether resistance exercise training benefits general physical performance. The study's results will benefit patients, researchers, and policymakers interested in treating patients with chronic heart failure s. The results support the idea that exercise is more important, so we encourage therapists to implement exercise in their daily heart failure routine regardless of the resources they can count on.

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