



RESEARCH REPORT

# Exercise training improves functional walking capacity and activity level of Nigerians with chronic biventricular heart failure



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## KEYWORDS

activity level exercise training;  
chronic heart failure;  
functional walking capacity

**Abstract** *Background:* Exercise training (ET) has been recommended as an adjunctive therapy in chronic heart failure but the role of ET in people with biventricular heart failure (BVF) has not been explored in Nigeria.

*Objective:* This study aimed to investigate the role of ET on functional walking capacity and activity level of Nigerians with BVF.

*Methods:* Sixty-six patients with chronic BVF in New York Heart Association Class II and III (mean age  $54.0 \pm 1.6$  years) recruited from a Nigerian tertiary hospital participated in the study. They were randomized into either the exercise group or control group. These patients were on their prescribed medications and underwent education/counselling sessions. In addition, patients in the exercise group performed aerobic and resistance training thrice weekly for 12 weeks. Functional walking capacity was assessed using the 6-minute walk test, oxygen consumption was estimated using the Duke Activity Status Index questionnaire while the Veterans' Specific Activity questionnaire was used to assess the activity level.

*Results:* The exercise group had significant improvements in all components of functional walking capacity and activity level. No significant improvement was observed in controls ( $p < 0.05$ ).

*Conclusion:* Supervised and structured ET is safe and beneficial for patients with BVF.

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## Introduction

Heart failure (HF) is characterized by the inability of the heart muscle to pump an adequate volume of blood to meet tissue energy demand that results in symptoms of fatigue or dyspnoea initially on exertion and then later on progressing to dyspnoea at rest [1,2]. It is a common and disabling syndrome that is a final pathway for a number of cardiac conditions [3]. HF is the most prevalent cardiovascular disease and the leading cause of sudden cardiac death in Nigeria [4]. Although the management of HF once focused exclusively on pump performance, HF is now considered a disorder whereby the peripheral effects of the disease are so debilitating that they warrant a treatment strategy that focuses on skeletal muscle improvement and improved exercise tolerance [3,5].

Despite major advances in pharmacological treatment of HF, the number of people afflicted with HF is rising yearly and many patients suffer from dyspnoea, fatigue, diminished exercise capacity, and poor quality of life [6]. In the past, patients with HF were advised to avoid physical exertion in the hope that bed rest might minimize symptoms and in the belief that physical activity might accelerate the progression of left ventricular dysfunction [7]. It is now known that a reduction in physical activity either produced by the symptoms of HF or prescribed by physicians treating HF leads to a state of physical deconditioning that contributes to these symptoms including exercise intolerance [8]. All these symptoms may lead to a significant reduction in physical and mental health, which results in a markedly decreased quality of life. However, in addition to pharmacotherapy, exercise training has been reported to have a place in its management especially in patients with left ventricular HF [9,10]. The majority of previous studies focused on HF of ischaemic origin and among Caucasians. However, there is need to understand the response to exercise training in other populations with systolic biventricular HF secondary to either hypertension or cardiomyopathy.

Despite recommendation of exercise training in most guidelines as a useful intervention for patients with stable chronic HF, acceptance of exercise training by the medical community as an adjunct in patient management has been less enthusiastic [3]. Many physicians remain concerned about implementation of exercise programme in this high-risk group, in terms of methodology and safety [11]. Standard exercise training protocols usually involve a combination of aerobic and resistance training. Beckers et al [12] demonstrated in HF patients that combined exercise training had a more pronounced effect on submaximal exercise capacity, muscle strength, and quality of life than pure endurance training, without unfavourable effects on left ventricular remodelling and outcome parameters [12].

Robust data on improvement in outcomes of exercise training in patients with chronic HF of ischaemic aetiology due to left ventricular dysfunction exist among Caucasians. There seems to be a dearth of literature for reference in Nigeria where HF is mainly nonischaemic in aetiology and the sufferers present late for medical care with biventricular HF. Thus, supervised exercise training has not been part of HF management in Nigeria. To address these gaps in knowledge, the present study investigated the role of

exercise training on exercise walking capacity and activity level of Nigerians with stable biventricular HF.

## Methods

### Study design

A randomized controlled trial design was used in this study. There were two treatment arms: exercise group and control group. Outcome measurements were performed at baseline and immediately after the 12-week intervention period.

### Patients

Patients were recruited from a population of chronic HF patients receiving treatment at the cardiology clinic of Lagos University Teaching Hospital, Lagos, Nigeria. They were in Class II and III of the New York Heart Association (NYHA) classification. The study was carried out in the medical gymnasium of the Physiotherapy Department, Lagos University Teaching Hospital. Sample size was calculated using the equation postulated by Eng [13]. The minimum number of patients expected to participate in the study was 46, with 23 in each group.

The patients involved in this study were Nigerians diagnosed with biventricular chronic HF secondary to hypertension or of dilated cardiomyopathy. The patients were oriented to person, place, and time, in Class II and III of New York Heart Association (NYHA) classification, on their standard pharmacologic therapy for HF (diuretics, ACE inhibitors,  $\beta$  blockers, and digoxin). They had no change in medical therapy for at least 30 days with resting ejection fraction  $\leq 40\%$  as measured by echocardiography medical diagnosis of HF either hypertensive or idiopathic in origin.

Individuals with the following conditions were excluded from participating: chronic HF of ischaemic origin, valvular diseases, and rheumatic diseases, clinical evidence of decompensated HF, atrial fibrillation, acute HF within the previous 3 months, unstable angina pectoris, end-stage renal disease, or orthopaedic impediments to exercise and patients participating in a formal exercise programme within 30 days prior to this study.

### Ethical considerations

The protocol for this study was approved by the Health Research and Ethics Committee of the Lagos University Teaching Hospital, Idi-Araba, Lagos, Nigeria before the commencement of the study. Written consent was also obtained from patients prior to enrolment into the study. All experiments were done in accordance with the Declaration of Helsinki.

### Randomization

The patients were randomized into the exercise group or control group. A randomization list was produced by a computer generated random-number sequence in blocks of 10 to ensure consistent patient distribution in both groups.

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