



## Functionality in Heart Failure Patients

Angie VG<sup>1</sup>, Faysuri VM<sup>1</sup>, Nathali CT<sup>2\*</sup> and Alejandro SO<sup>3</sup>

<sup>1</sup>Physiotherapist, Universidad Santiago de Cali, Colombia

<sup>2</sup>Professor of Physiotherapy, Universidad Santiago de Cali, Colombia

<sup>3</sup>Professor of Biomedical Sciences, Universidad Santiago de Cali, Colombia

**\*Corresponding author:** Nathali Carvajal Tello, Professor of Academic Program of Physical Therapy, Universidad Santiago de Cali, Research group Health and Movement, Postal code: 760036, Colombia, Tel: 3183308401 & 00+ 57+25183000; Email: carvajaltellonathali@gmail.com

### Mini Review

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### Abstract

Heart failure can be defined as the result of the alteration of different structures at the heart level (heart muscle layers and/or great vessels) but it is mostly due to an alteration in the function of the left ventricular myocardium compromising the pre-load and post-load in the ventricles. In these patients there are clinical manifestations, such as: decrease in aerobic capacity, presence of choking sensation and tiredness and sometimes water retention, which can end up in peripheral edema and pulmonary congestion, evidencing an alteration in the functional capacity in their daily activities.

**Keywords:** Level of Functionality; Chronic Heart Failure; Barthel Index; Cardiac Rehabilitation; Older Adult; Functional Independence

### Introduction

Heart failure is defined by the American Heart Association (AHA) as “a complex clinical syndrome that may result from any structural or functional heart disorder that affects the ability of the ventricle to fill or expel blood” [1]. Heart failure is one of the leading causes of death worldwide from late-stage cardiovascular disease [2]. Among the clinical manifestations that can be found in a patient with heart failure is a decrease in aerobic capacity, therefore there will be the presence of dyspnea and fatigue with minimal effort, causing effects on the body that cause an alteration in the functional independence of a person requiring greater effort to perform their daily activities [2]. Functional independence is defined as the ability to carry out activities related to self-care, therefore, functional dependence is the opposite, being defined as the loss of that ability to carry out activities of primary need [3].

In the literature there are different questionnaires which allow us to measure this functional independence, among the most used are the Lawton and Brody Scale, the Katz Index and the Barthel Index. Most of the time a subjective

evaluation is made about the functionality in patients with heart failure [4]. The Barthel Index instrument evaluates the performance of 10 activities of daily living, which are: eating, moving from chair to bed, performing personal hygiene, bathing, dressing, going up and down stairs, moving around, maintaining sphincter control, among others, whether independent or dependent. It is an easy-to-apply instrument that handles a score between 0 (totally dependent) and 100 (totally independent) with an estimated time of 5 minutes performing it. Its application does not present any type of risk and can be easily adapted to different cultural environments [5]. Among its advantages is that it is translated into Spanish and validated for use in different countries. This index makes it easier for the health professional to make an evaluation of the level of functionality of the patients [6].

With regard to heart failure, there is a classification that makes it possible to know the functionality according to the severity, the functional classification of the New York Heart Association (NYHA), which is based on the symptomatology and physical capacity of the patient evaluated and which has proven to be useful in clinical practice. This classification is

composed of four classes, where a patient located in class I has no limitation in physical activity and class IV is incapable of performing any physical activity [7]. It is very important to take into account the effect on functionality according to the assessment made in these patients.

Cardiac rehabilitation programs have as part of their objectives to improve the functionality of the practitioners, these programs have been designed to provide a secondary prevention to cardiovascular diseases being a fundamental component at the time of service delivery through physical training, which is a fundamental component of cardiac rehabilitation programs that in combination with pharmacological therapy, is recommended for those users who have a reduced ejection fraction [8]. Therefore, according to the above, the World Health Organization (WHO) defines these programs as necessary and important for achieving optimal functioning by slowing or stopping the progression of cardiovascular disease through strategies such as psychosocial support, education and therapeutic exercise that promote a healthy lifestyle [9].

In a descriptive study that evaluated the functional capacity of older adults who attend a cardiac rehabilitation program with a total of 18 patients, to whom the Barthel index was applied to determine the variables in which they presented a decrease, it was found that this type of patients in the fifth week of admission present a slight dependency specifically for going up and down stairs, but when they reach the eighth week of attending the cardiac rehabilitation program, that dependency is reduced to the maximum, achieving that the subjects of the study obtain 100% independence in this item [10].

## Cardiac Failure

### Epidemiology

Heart failure affects more than 23 million people worldwide, representing a large public health burden of cardiovascular disease [11]. Specifically, it affects about 2% of adults worldwide with an age-dependent prevalence of less than 2% in people under 60 years of age and more than 10% in older adults over 70 years of age. There is an increase in values when patients with asymptomatic left ventricular dysfunction are incorporated, including a 36% increase in people over 60 with diastolic dysfunction. The prevalence is expected to increase by 25% in the next 20 years as a result of the rising rate of old age [12].

In Latin America, the incidence of heart failure in Brazil has been described as 199 cases per 100,000 people per year. In Argentina, cases of cohorts with an incidence of heart failure of 137 and 557 per 100,000 people per year have also

been described [13]. The incidence of heart failure increases with age. In Colombia, it increased in the latter from 2 between the ages of 35 and 64 years and 12 between 65 and 94 years per 1,000 inhabitants [14]. In Colombia, for the period 2000-2012, the origin of mortality from cardiovascular diseases is predominantly male with 136 and female with 125 per 100,000 people [15] with a total of 47,704,472 citizens, the estimated prevalence of heart disease in Colombia is 2.3%, which translates into approximately 1,097,201 Colombian patients diagnosed with heart failure. On the other hand, a report by the American Heart Association in 2010 showed a prevalence in the United States of 6.6 million (2.8%) with heart failure in people over 18 years of age. It is expected that by 2030 the number of people suffering from this disease will increase to 3 million [16].

### Signs and Symptoms

Heart failure is a characteristic clinical diagnosis for manifestations that are the cause of structural and/or functional deficiencies of the heart. Among the most relevant symptoms are: shortness of breath, localized edema at the ankle and fatigue. Among the most common signs are: a rise in venous pressure, the existence of an abnormal heart sound, edema at the peripheral level and lung crackles. It should be noted that the pathology may be present without the existence of any or all of the findings already mentioned [17].

### Aetiology

Heart failure is more than a complete diagnosis; it is a syndrome that must always be the underlying cause of heart dysfunction. Among the most common causes are ischemic heart disease and hypertension (which has been significantly reduced by blood pressure management). Degenerative valve disease, commonly aortic stenosis, is a cause that is likely to increase as the population ages [18].

### Physiopathology

The structure of the myocardium in heart failure are highly recognized abnormalities. Where cardiac remodeling is required, it is a process in which the structures and morphological changes are accompanied by functional deterioration. Hypertension produces a hypertrophy of the left ventricle, which is a cause of heart failure. Also, due to a little oxygenation of the tissue, necrosis and fibrosis can be generated, producing thinning in the ventricular wall, leading to cardiomyopathy [19].

The heart is a vital organ which has a high metabolic demand. In addition, it is rich in mitochondria which represent approximately 35% of the volume of the heart

tissue and generate up to 90% of the necessary ATP. Heart failure has been defined as: “engine without fuel” implying mitochondrial dysfunction as an important component of this pathology [20].

The development of heart failure implies alterations at the tissue and cellular level, among which we can mention: the decrease of myocardial contractility caused by a cardiac ischemia, deficit in the capacity to respond to reactive oxygen species, changes in the ionic flows, electrophysiological alterations and fibrosis leading to a loss of cardiomyocytes and the realization of modifications in the capacity to metabolize and produce energy [21]. Evidence shows that some patients with heart failure have decreased activity of mitochondrial respiratory enzymes and have 25-30% reduction in ATP (Adenosine Triphosphate) levels [21].

### Functionality

Functionality as a multidimensional concept, is defined as any physiological and/or physical capacity to perform daily life activities in an autonomous way. Therefore, functional independence is defined as the fulfillment of actions that are necessary in the day to day subsisting independently in a stable body and mind relationship [22]. When there is a loss of functionality and a limitation in the performance of some of the activities mentioned above, the term disability appears, which is defined as, a state in which a person presents losses in physical capacity requiring assistance for the execution of his/her daily life activities [23]. There are different measurement instruments that allow us to evaluate the functionality and thus to know the level of it in each one of the patients:

#### Functional Independence Measure (FIM)

It is a tool used worldwide to measure disability. This scale evaluates the motor and cognitive components in order to carry out timely treatment, recognizing and comparing the impact of the intervention carried out [24]. It evaluates a total of 18 activities grouped in 2 dimensions (13 items in the motor dimension and 5 items in the cognitive dimension) which are conformed in 6 groups that evaluate transfers, communication and awareness, personal care, sphincter control, locomotion. Their scores range from 18 points (functional dependence) and 126 points (functional independence) [24].

#### Katz Index

It was published around 1963 and was conducted by a multidisciplinary group at The Benjamin Rose Hospital for inpatients with hip fractures. Currently, this scale is mainly used in the field of intervention and geriatrics [5,25]. It

evaluates in six basic functions the degree of independence or dependence of patients (Continence, toilet use, mobility, dressing, feeding and bathing). The final score is given by levels of A-G, being A (independent in all functions) and G (dependent in all functions) [5].

#### Lawton and Brody's Index

This instrument collects the evaluation of the basic activities of daily life complementing this information with the aspects about the instrumental activities [25]. This scale collects, in eight groups if it is the case of women or five in men, items that they evaluate (ability to manage their finances, medication control, shopping, housework, food preparation, laundry, telephone use, transportation). The total score ranges from zero (Maximum dependency) to eight or five (Total independence) [25].

#### The Barthel Index

It is considered among the great variety of existing instruments as the best in terms of sensitivity, simplicity, communicability and ease of scoring when evaluating the execution of daily life activities [26]. It was first developed in 1965 by Mahoney and Barthel and originally consists of 10 items related to 10 activities which include: bathing, personal hygiene, sphincter control, use of the toilet and transfers, and feeding, which are rated according to the functional capacity that the patient has to perform them independently, with assistance or totally dependent. The final score is obtained by adding up each of the individual scores and this will vary between 0 (total dependence) and 100 (total independence) [26].

### Conclusion

It should be noted that it is extremely important to evaluate with the most appropriate instrument the functionality in this type of population by entering a cardiac rehabilitation program, which facilitates measuring and identifying the impact of the intervention with a before and after. Thus, from a comprehensive view, it will be possible to know the impact of these programs for this type of population on their functionality.

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