

# Changes in Physical Capacity and Some Physiological Variables in Patients with Heart Failure at 6 and 12 Weeks of a Cardiac Rehabilitation Program

Adrian González-Méndez <sup>1\*</sup>, Ana I. López-Cruz <sup>2</sup>, Sandra Rodríguez-Hernández <sup>2</sup>, Lorelys Molinet-González <sup>2</sup>

<sup>1</sup> Department of Graduate Studies and Research, Faculty of Medical Sciences.

<sup>2</sup> Department of Physiology, Faculty of Medical Sciences, University of Medical Sciences, Sancti Spiritus, Cuba

\*Corresponding Author: Adrian González-Méndez, Department of Graduate Studies and Research, Faculty of Medical Sciences.

Received Date: December 15, 2023; Accepted Date: December 28, 2023; Published Date: January 05, 2024

**Citation:** Adrian G. Méndez, Ana I. López-Cruz, Sandra R. Hernández, Lorelys M. González, (2024), Changes in Physical Capacity and Some Physiological Variables in Patients With Heart Failure at 6 and 12 Weeks of a Cardiac Rehabilitation Program, *J. Clinical Cardiology and Cardiovascular Interventions*, 7(1); DOI:10.31579/2641-0419/345

**Copyright:** © 2024, Adrian González-Méndez. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Betancourt-Peña 1's article entitled: "Changes in physical capacity and some physiological variables in patients with heart failure at 6 and 12 weeks of a cardiac rehabilitation program", published in October 2021 in his journal, has been read with interest. He highlighted the usefulness of the sociodemographic characteristics of patients in the city of Cali, Colombia in the months of September to December 2017, in which it was evidenced that the sex with the highest participation was male, with a ratio of four out of five individuals. The most frequent regimen to which the participants were affiliated was the contributory one, the average left ventricular ejection fraction (LVEF) of the patients was  $34.9 \pm 1.4$ . The change in the absolute values of the weight and BMI variables was minimal during the 12 weeks of rehabilitation; This change showed no statistically significant difference ( $p > 0.05$ ). Baseline and endpoint systolic blood pressure (SBP) measurements showed similar behaviors, and there was evidence of a decrease at the end of rehabilitation of 12.2 mmHg for baseline SBP and 17.4 mmHg for end-of-rehab SBP. It was evident that the initial heart rate decreased by 6.2 l/min at the end of rehabilitation, but the greatest change was recorded during the first 6 weeks, with a reduction of 6.8 l/min, the latter being statistically significant ( $p = 0.005$ ). The variables of oxygen consumption and MET showed a progressive increase during rehabilitation, increasing 3.6 ml/kg/min and 1.1 ml/kg/min, respectively; However, we share some observations that we believe would enrich the analysis of the information, especially aimed at the staff who work in rehabilitation programs with this group of patients:

We want to compare these findings with other published studies related to physiological changes. In a study by Ávila-Valencia et al.<sup>2</sup>, where a quasi-experimental was carried out, between the months of September and December 2016, in patients with heart failure who attended a Cardiac Rehabilitation (CR) program in a clinic in the city of Cali, Colombia, at the beginning and at the end of the aerobic predominance exercise program, it was evidenced that the variables Heart Rate (HR) at rest presented a significant decrease ( $73.3 \pm 2.7$ ). systolic blood pressure decreased by 13.7 mm Hg $\pm$ 4.1, VO<sub>2</sub>max and MET had a statistically significant increase ( $5.4 \pm 0.9$ ) when performing the stress test; Rest weight ( $71.3 \pm 3.4$ ), BMI ( $26.1$

$\pm 1.1$ ) and DBP ( $70 \pm 2.8$ ) at the end of the stress test did not show significant changes.

In 2020 at the Universidad del Gran Rosario<sup>3</sup>, a retrospective and qualitative literature review was carried out based on 10 articles selected by searching scientific databases. Among the different studies analyzed, one study by Rhodes et al.<sup>4</sup>, in which it is observed that, during the 6 months prior to the start of the rehabilitation program, 188 patients aged 6 to 17 years completed exercise tests with expiratory gas analysis, of which 71 did not have a congenital heart defect of sufficient severity to be included in the study, and 33 were excluded because they had a VO<sub>2</sub>max and peak work rate lower than the predicted 80%. The results found in the effect of the cardiac rehabilitation program at peak exercise were that after the program there was a significant increase in VO<sub>2</sub>max (from  $26.4 \pm 9.1$  to  $30.7 \pm 9.2$  ml/kg/min) and peak work rate (from  $93 \pm 32$  to  $106 \pm 34$  W).

Ku-Gonzalez et al.<sup>5</sup> In his quasi-experimental study where VO<sub>2</sub>p measured by exercise load was evaluated before and after receiving a supervised concurrent training program of conventional effort, he found that 70.6% were male, mean age  $61.5 \pm 8.9$  years, with average left ventricular ejection fraction of  $38 \pm 4.6\%$ ; 96.8% of the HF that was of ischemic origin, 55.9%, 29.4% and 5.9% in functional class according to the *New York Heart Association* I, II and III, respectively and with an average volume of  $504.34 \pm 164$  MET-min/week. When analyzing the patients in the risk groups by the maximum tolerance to exertion obtained by the VO<sub>2</sub>p reached in the initial stress test, they obtained a VO<sub>2</sub>p-load of  $5.9 \pm 2.1$  MET and 74.4% of the population was placed in groups C and D, who obtained  $< 7$  METs in the initial stress test. the average volume of training granted was  $504.3$  MET-min/week  $\pm 164.7$ , in which an  $Rho=0.486$  ( $p = 0.008$ ) was obtained in the patients analyzed.

Multiple studies have shown that cardiovascular exercise confers important benefits for patients with heart failure, generating peripheral and central adaptations such as: improvement in skeletal muscle metabolism, endothelial function, increased vasodilation and improvements in the redistribution of cardiac output, hemodynamic changes at the level of volumes in the cardiac

chambers, ejection fraction and lung pressure at rest and exercise. In the prescription of exercise for patients with heart failure, guidelines and protocols usually recommend performing a test to assess the initial functional capacity of these patients, risk stratification and for the diagnosis of some other undiagnosed pathology, although usually these patients are already referred stable and well studied; These can be performed on a band, arm or leg ergometer.<sup>6</sup>

The therapeutic intervention of patients with congenital heart disease is a tool that health professionals around the world should evaluate and use in particular, due to the pathophysiological differences presented by patients with these alterations. This makes it necessary to specify specific forms of the elements to be taken into account when indicating an objective treatment from the different areas of health care.

### Financing

The authors declare that they have not received funding.

### Conflict of Interest

The authors declare that there is no conflict of interest.

### Ethical Responsibilities

#### Protection of people and animals.

The authors state that no experiments have been conducted on humans or animals for this research.

### Data Confidentiality.

The authors state that no patient data appear in this article.

### Right to privacy and informed consent.

The authors state that no patient data appear in this article.

## Bibliography

1. Betancourt-Peña J, Ruiz-Serna Ó, Martínez-Gómez S, Saavedra-Fernández P, Assis Jorge K, Ávila-Valencia JC. Changes in physical capacity and some physiological variables in patients with heart failure at 6 and 12 weeks after a cardiac rehabilitation program. *Rev. Colomb. Cardiol.* 2021; 28( 5 ): 502-509.
2. Ávila-Valencia JC, Hurtado-Gutiérrez H, Benavides-Córdoba V, Betancourt-Peña J. Aerobic exercise in patients with heart failure with and without ventricular dysfunction in a cardiac rehabilitation program. *Rev Colomb Cardiol.* 2019; 26(3):162-168.
3. Martina-Florencia A. Cardiovascular rehabilitation in children and adolescents with congenital heart disease [To access the undergraduate degree in Kinesiology and Physiatry]. Universidad del Gran Rosario, Santa Fe-Argentina. 2020. Available in: <https://hdl.handle.net/20.500.14125/129>
4. Rhodes J, Curran T, Camil L, Rabideau N, Fulton D, Gauthier N, et al. Impact of cardiac rehabilitation on exercise function in children with severe congenital heart disease. *Pediatrics.* 2005; 116(6): 13391345. Available in: <https://pubmed.ncbi.nlm.nih.gov/16322156/>
5. Ku-Gonzalez A, Lara-Vargas JA., Pineda-Garcia AD., Lastra-Silva VJ., Villeda-Sanchez M, Leyva-Valadez EA. et al . Correlation of training volume in MET-min/week with the percentage of VO<sub>2</sub>p-load gain in patients with heart failure with reduced ejection fraction undergoing a cardiac rehabilitation program. *Arch. Cardiol. Méx.* 2021; 91( 2 ): 190-195.
6. Moraga-Rojas C, Soto-Fonseca JD. Prescription of exercise during cardiac rehabilitation of patients with heart failure. *Rev. costarric. cardiol.* 2021; 23( 1 ): 21-27. Available in: [http://www.scielo.sa.cr/scielo.php?script=sci\\_arttext&pid=S140941422021000100021&lng=en](http://www.scielo.sa.cr/scielo.php?script=sci_arttext&pid=S140941422021000100021&lng=en).



This work is licensed under Creative Commons Attribution 4.0 License

To Submit Your Article Click Here:

[Submit Manuscript](#)

DOI:10.31579/2641-0419/345

### Ready to submit your research? Choose Auctores and benefit from:

- fast, convenient online submission
- rigorous peer review by experienced research in your field
- rapid publication on acceptance
- authors retain copyrights
- unique DOI for all articles
- immediate, unrestricted online access

At Auctores, research is always in progress.

Learn more <https://auctoresonline.org/journals/clinical-cardiology-and-cardiovascular-interventions>