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High-Intensity Interval Versus Aerobic Continuous Training in Three-Week Inpatient Cardiac Rehabilitation: Preliminary Results of a Randomized Study

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Introduction: Exercise-based cardiac rehabilitation is an established component of heart failure management. However, optimal exercise training intensity remains uncertain, particularly in short-term inpatient programs.[1-5] This study aimed to compare high-intensity interval training (HIIT) and aerobic continuous training (ACT) regarding exercise capacity and cardiac function during a three-week inpatient cardiac rehabilitation program.

Patients and Methods: This preliminary randomized study included 33 patients with heart failure and a left ventricular ejection fraction (LVEF) ≤40% at enrollment, allocated to HIIT (n = 17) or ACT (n = 16) during three-week inpatient rehabilitation. Cardiopulmonary exercise testing (CPET), the six-minute walk test (6MWT), and echocardiographic parameters were assessed at baseline (T1) and after rehabilitation (T2). Changes over time and between-group differences were evaluated using a two-way mixed analysis of variance (ANOVA; Time × Group). Within-group changes were assessed using paired Student's t-tests, supplemented by Wilcoxon signed-rank tests. Analyses were exploratory, with significance set at an unadjusted $p < 0.05$.

Results: Overall, mean relative peak oxygen uptake (VO_2peak) increased from 17.63 to 20.24 mL/kg/min (+14.8%; $p < 0.001$), peak power output increased by 16.2 W ($p < 0.001$), and 6MWT distance improved by 62 m ($p < 0.001$). LVEF increased from 35.8% to 38.5%, while global longitudinal strain (GLS) became more negative, from −11.2% to −12.3% (both $p < 0.001$). Within-group analyses showed significant improvements in VO_2peak, exercise capacity at the second ventilatory threshold (VT2), 6MWT distance, LVEF, and GLS in both groups. For most outcomes, improvements did not differ significantly between HIIT and ACT. However, exploratory Time × Group interactions revealed greater increases with HIIT in absolute oxygen uptake at the first ventilatory threshold (VT1; +136 vs. +24 mL/min; $p = 0.021$) and relative oxygen uptake at VT1 (+1.69 vs. +0.48 mL/kg/min; $p = 0.026$). Conversely, ACT demonstrated greater improvements in relative VO_2peak (+3.07 vs. +2.17 mL/kg/min; $p = 0.041$) and 6MWT distance (+82 vs. +44 m; $p = 0.043$).

Conclusion: Three-week inpatient cardiac rehabilitation was associated with substantial improvements in exercise capacity, functional performance, and cardiac function in both groups. Measurable physiological adaptations were evident after only three weeks. Neither HIIT nor ACT demonstrated clear overall superiority, although exploratory analyses suggested potentially distinct patterns of adaptation. These preliminary findings highlight the potential benefits of short-term structured inpatient cardiac rehabilitation and warrant confirmation in a larger randomized sample.

LITERATURE

1. Køber L, Adamo M, Ruwald AC, Tomasoni D, Anderson LJ, Andersson C, et al. 2026 ESC Guidelines for the management of heart failure. Eur Heart J. 2026;47(38):5346-5457. https://doi.org/10.1093/eurheartj/ehag100
2. Bäck M, Wilhelm M, Marcin T, Machado FVC, Sandberg A, Buccheri S, et al. 2026 ESC Guidelines on cardiac rehabilitation. Eur Heart J. 2026 Oct 23;47(39):5631-5729. https://doi.org/10.1093/eurheartj/ehag099
3. Bjarnason-Wehrens B, Nebel R, Jensen K, Hackbusch M, Grilli M, Gielen S, et al. Exercise-based cardiac rehabilitation in patients with reduced left ventricular ejection fraction: The Cardiac Rehabilitation Outcome Study in Heart Failure (CROS-HF): A systematic review and meta-analysis. Eur J Prev Cardiol. 2020;27(9):929-952. https://doi.org/10.1177/2047487319854140
4. Molloy C, Long L, Mordi IR, Bridges C, Sagar VA, Davies EJ, et al. Exercise-based cardiac rehabilitation for adults with heart failure. Cochrane Database Syst Rev. 2024;(3):CD003331. https://doi.org/10.1002/14651858.CD003331.pub6
5. Taylor RS, Walker S, Smart NA, Piepoli MF, Warren FC, Ciani O, et al. Impact of exercise-based cardiac rehabilitation in patients with heart failure (ExTraMATCH II) on mortality and hospitalisation: an individual patient data meta-analysis of randomised trials. Eur J Heart Fail. 2018;20(12):1735-1743. https://doi.org/10.1002/ejhf.1311

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