

# **Effect of Concurrent aerobic-resistance training on aerobic power, heart structure and function, heart rate variables, Galectin-3 and N-terminal pro-brain natriuretic peptide in patients with chronic heart failure**

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Heart failure is a clinical syndrome and Biomarkers (NT-pro BNP and Galactine-3) are used to identify and show the results of therapeutic measures for these patients. The aerobic-resistance exercise training and cardiac rehabilitation can increase exercise tolerance in patients with heart failure, it is useful as secondary prevention. The aim of this study was to evaluate the effect of a course of aerobic-resistance training on aerobic power, heart structure and function, heart rate variables, galectin-3 and NT-proBNP in patients with chronic heart failure. In this study, 76 patients with chronic heart failure participated in two groups of experimental and control groups with a mean age of  $72 \pm 7$ , II and III grades of NYHA with  $EF \leq 40\%$  volunteering. The experimental group performed 8-week, 3 sessions per week and 45-60 minutes each session, a combined exercise program, and 4 days a week, walking 4 days a week for 30 minutes with an intensity of 70-50% of maximum heart rate. Exercises include 5 minutes of warming and cooling, aerobic exercises was performed with intensity of 60% -50% of maximal heart rate in the first week and increase gradually to 85% of maximum heart rate in eighth week, along with weight training and theraband for 8 major muscles. Before and after the training period were measured aerobic power, heart rate variables, heart rate echocardiography and NT-proBNP and galectin-3 values. After collecting the data, in the statistical analysis, Shapiro-Wilk test was used to evaluate the normal distribution of data and for parametric and nonparametric data on intra-group changes of t-correlated and Wilcoxon tests and in the changes between the two groups, the independent t-test and Umen Whitney were

used. The significance level was considered as  $\alpha \leq 0.05$ . The results showed that after eight weeks of aerobic-resistance training in weight ( 75.17 to 73.15), BMI ( 27.48 to 26.73), WHR ( 0.930 to 0.840) NT-proBNP ( 120.65 to 105.67) and galactin-3 ( 92.67 to 91.62) was significantly different in the experimental group ( $p = 0.01$ ). The mean difference between the groups in the control group was 20.63 to 55.84 in the experimental group ( $p$

**Keywords :** Heart failure, aerobic- resistance exercises, Galactin-3, Aerobic power, Ejection fraction, Body composition

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