Type-B natriuretic peptide and VE/VCO2 slope are reduced by low but not high intensity exercise training in chronic heart failure: a prospective randomized controlled study

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BACKGROUND

Recent studies have shown that increased levels of type-B natriuretic peptide (BNP) and high ventilation-carbon dioxide production relationship (VE/VCO2) slope were associated with worse prognosis in chronic heart failure (CHF). There are concerns regarding what exercise training program is better to improve inflammatory markers, ventilatory efficiency and BNP in CHF.

METHODS

Thirty men, 54±2 yr (mean ± se), with non-ischemic dilated cardiomyopathy, functional class II/III, LVEF < 40%, peak oxygen consumption (VO2) ≤ 17.4 ± 2.8 ml·kg⁻¹·min⁻¹ were randomly assigned to three training groups (HI = high intensity exercise training; AD = aerobic exercise training; ET = endurance training) and LT = low training (LT = no high intensity exercise). Energized training groups undertook daily training sessions of 20 min at incremental intensities to VO2max, BNP, high-sensitivity C-reactive protein (hs-CRP), adiponectin (ADI) and rest endocrinological (Al). VO2 was measured using the indirect calorimetric method. Carbohydrate intake was kept in the same. AD group underwent HI training with VO2peak of 223 ± 44.5 W, HI group VO2peak of 263 ± 52.8 W and ET VO2peak of 110 ± 33.8 W (interaction p = 0.038). Adiponectin (ADI) levels and HI group VO2peak were not different in each group. There was no negative correlation between VO2peak and ADI (r = 0.56, p = 0.005) and a positive correlation between changes in rest BNP and ADI (r = 0.33, p = 0.03). Acute HI and ET enhanced ventilatory capacity and reduced ADI and hs-CRP levels but only the HI reduced rest and peak BNP levels and VE/VCO2 slopes. HI group VO2peak of 223 ± 44.5 W is an efficient HI program and would be beneficial in CHF patients.

OBJECTIVES

The aim of this study was to evaluate the effects of a high and low continuous exercise training intensities programs on ventilation-carbon dioxide production relationship (VE/VCO2) slope, plasma adiponectin, hs-CRP, rest and peak exercise BNP levels and functional capacity (Peak VO2) in non-ischemic dilated cardiomyopathy patients.

PATIENTS AND METHODS

Study Design

Variables Before and After the Protocol

RESULTS

CONCLUSIONS

• Either high or low exercise training intensities were efficacious to enhance maximal functional capacity and reduced AD and hs-CRP circulating levels.

• Only the low intensity training improved submaximal oxygen uptake (VO2 at AT) and reduced BNP level what may have prognostic and clinical implications.

• Only the low intensity training improved ventilatory efficiency (VE/VCO2 SLOPE)