Abstract: P638

High intensity interval exercise training improves endothelial function in patients with heart failure with preserved ejection fraction

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Background: Cardiac rehabilitation has traditionally involved low-to moderate intensity continuous exercise training (MICT). There is growing evidence that high intensity interval exercise training (HIIT) shows similar or greater efficacy compared with MICT. However, the relationship between the training modality and its effects on endothelial function still remains to be elucidated.

Purpose: To evaluate the impact of high intensity interval exercise training versus low-to moderate intensity continuous exercise training on circulating blood markers of endothelial function: the stable end product of nitric oxide (NOx), S–nitrosothiols (RSNO–reservoir for bioavailable nitric oxide), dimethylarginine (ADMA) and symmetric dimethylarginine (SDMA) in patients (pts) with heart failure with preserved ejection fraction (HFpEF).

Methods: A total of 43 pts with HFpEF (mean age 57.5±6.8y) admitted at residential rehabilitation center were enrolled in the study. Patients were randomized to HIIT, (HIIT group, n=20) and MICT, (MICT group, n=23). At baseline and 3 weeks later, in all pts values of NOx, RSNO, ADMA and SDMA were determined and exercise test was performed.

Results: After 3 weeks NOx increased significantly in both groups: in HIIT group (from 34.7±7.5 to 48.5±8.3 µmol/l, P<0.0001), in MICT group (from 35.0±9.5 to 42.5±10.0 µmol/l, P<0.05), and value of NOx after 3 weeks was higher in HIIT than in MICT group (P<0.05). Value of ADMA as well of SDMA decreased in both groups after 3 weeks, and this decrease was significant in HIIT group: ADMA in HIIT group (from 0.305±0.055 to 0.250±0.077 µmol/l, P<0.005) and in MICT group (from 0.325±0.0.069 to 0.280±0.140 µmol/l, ns); SDMA in HIIT group (from 0.285±0.050 to 0.240±0.060 µmol/l, P<0.005) and in MICT group (from 0.270±0.080 to 0.247±0.063 µmol/l, ns). Value of RSNO significantly increased in both groups, with higher increase in HIIT group: in HIIT group (from 3.0±1.5 to 5.1±1.7 µmol/l, P<0.001), in MICT group (from 3.2±1.7 to 4.5±2.3 µmol/l, P<0.05). Compared to the baseline, at the end of the study, exercise capacity (METS) was significantly higher in both groups (P<0.0001). Higher increase in METs in HIIT group during exercise training (by 39.8%), compared to increase in MICT group (by 27.2%), resulted in significantly higher exercise tolerance in HIIT than in MICT group at the end of the study (P<0.02). In both groups, adverse events during or after exercise training, were not occurred.

Conclusions: In pts with HFpEF high intensity interval exercise training as well as low-to moderate intensity continuous exercise training induced favorable modification of endothelial function, expressed through increase of NOx and RSNO, and decrease of ADMA and SDMA. More significant increase of NOx and RSNO, and significant decrease of ADMA and SDMA gives an advantage to HIIT over MICT exercise training in patients with HFpEF.