Effects of Long-term Exercise Training on Endothelial Function and Arterial Stiffness in Patients With Atrial Fibrillation

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Introduction: The study sought to evaluate the effects of exercise training (ET) on endothelial biomarkers and carotid artery stiffness, and their potential contribution to the training-related increase in peak exercise oxygen consumption (Vo2) in patients with atrial fibrillation (AF).

Methods: A total of 53 patients with AF (age 64±1 years) were prospectively randomized to 24 weeks of ET (running and leg ergometry, n = 25) or attention control (CT) (n = 28). Exercise training was performed as running or cycling on a treadmill or bicycle ergometer 3 times a week for 24 weeks. Each session started with a 10-minute warmup at 60% to 70% of maximal heart rate (HRpeak), followed by four 4-minute intervals at 80% to 90% of HRpeak with 3 minutes of active recovery at 60% to 70% of HRpeak between intervals, ending with a 5-minute cooldown period. During AF, patients exercised at the same treadmill or cycling speed and watt as in the previous sessions in sinus rhythm. Peak Vo2, intimal-medial thickness (IMT) of the carotid artery measured by high-resolution ultrasound, and left ventricular function were measured at baseline and follow-up assessments. In addition, plasma von Willebrand factor (vWF), endothelin-1, nitric oxide, tumor necrosis factor alpha, interleukin 1 beta, interleukin 6, and interleukin 10 levels were measured as indices of endothelial function.

Result: ET increased the peak Vo2 (ET: 27.3±7.2 ml/kg/min vs. CT: 22.7±5.2 ml/kg/min, p= 0.0001) and decreased total vWF levels (ET: 107.0±40.3 IU/dL vs. CT: 140.8±47.9 IU/dL, p=0.004). However, carotid arterial IMT (ET: 1.1±0.3 mm vs. CT: 1.0±0.2 mm, p=0.419) did not throughout the study, and there was no intergroup difference after 24 weeks. Similarly, resting left ventricular systolic and diastolic function were not different, with no intergroup differences after 24 weeks.

Conclusion: ET is a non-pharmacological option to improve endothelial function in patients with AF by decreasing the vWF level. Further studies should be conducted at multiple centers and with a larger sample size.