Exercise Biochemistry Review

Proceedings of IBEC 2018, Beijing, China, October 23-25
PO-078

Effects of aerobic and resistance training on cardiac diastolic dysfunction in type 2 diabetic rats

Shunchang Li[1],Derun Gao[1],Ismail Laher[2],Quansheng Su[1]
1.Chengdu Sport Institute
2.University of British Columbia

Objective To compare the effects of two types of physical training on cardiac diastolic dysfunction in type 2 diabetes mellitus and investigate the role of passive tension regulators—titin and collagen.
Methods Sprague-Dawley (SD) male rats were divided into two groups: control and diabetes. Each group was subdivided into three subgroups: sedentary rats, rats submitted to aerobic trained and rats submitted to resistance training. Diabetic rats were induced by high-fat diet combined with low-dose injections of streptozocin (STZ). Aerobic trained rats ran on a treadmill at 21m/min for 60 min per day, while resistance trained rats climbed a ladder with incremental loads. The train period lasted for 8 weeks.
Results All diabetic rats had increased fasting blood glucose (FBG) and left ventricular end diastolic pressure (LVEDP), a lower down stroke of the pressure curve (dp/dt min), longer exponential time constants of relaxation (Tau) in relation to control rats, while the protein expression of titin was decreased significantly, and the expression of collagen I, TGFβ1 were increased slightly, the ratio of type I and III collagen was raised in diabetic rats. Both types of training promoted a decrease in FBG and HOMA-IR in diabetic rats. Aerobic exercise trained diabetic rats had significant higher –dp/dtmin, and shorter Tau, but -dp/dtmin and Tau in resistance exercise trained diabetic rats had no significant been improved, even more aggravation. Moreover, aerobic training increased the protein expression of titin and HSP27, and the amount of co-localization of titin and HSP27 elevated, the protein expression of collagen I, TGFβ1 were decreased, and the ratio of type I and type III got close to normal. Resistance training further decreased the expression of titin, collagen I, and TGFβ1, collagen volume fraction (CVF) was increased significantly, and the ratio of type I and III collagen was disturbed, but the co-localization of titin and HSP27 elevated slightly.
Conclusions Aerobic training ameliorates cardiac diastolic dysfunction in diabetes and this improvement may be related to increase titin repaired by HSP27, while resistance training aggravates the cardiac diastolic dysfunction in early diabetes mellitus and it could be caused by worsening myocardial interstitial fibrosis.