

Exercise volume modulates cardiac protection in a type 2 diabetic rat model: differential effects of high- and low-volume moderate-intensity training on diabetic cardiomyopathy

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Background: Cardiomyopathy is a major complication of diabetes, which prevalence rises at an alarming rate. Although major cardiology societies endorse exercise training to reduce cardiovascular risk in type 2 diabetes, the optimal modality, including the role of exercise volume, to prevent diabetic cardiomyopathy remains undefined.

Methods: Male Sprague Dawley rats were fed a high-sugar diet to induce type 2 diabetes. At diet onset, animals were assigned to high- (N=7) or low-volume (N=8) moderate-intensity training, five days per week for 18 weeks, while controls were kept sedentary (N=6). Echocardiography, strain analysis, and haemodynamic measurements were used to evaluate cardiac function. Plasma analysis was performed to identify systemic metabolic profiles of animals. Various ex vivo techniques were used to evaluate left ventricular cardiac fibrosis, oxidative stress, hypertrophy, inflammation, and metabolism.

Results: After 18 weeks of diet, sedentary rats developed diabetic cardiomyopathy characterized by impaired systolic function. High-volume exercise training prevented pathological cardiac remodelling by enhancing systemic and cardiometabolic status along with cardiac stress responses. In contrast, low-volume exercise training primarily attenuated left ventricular oxidative stress and inflammation, resulting in modest cardioprotective benefits.

Conclusion: Type 2 diabetic cardiomyopathy progression is modulated by exercise training volume, underscoring the need for evidence-based exercise prescriptions. Exercise volume study

