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Exercise Training Improves Cardiovascular Autonomic Activity and Attenuates Renal Damage in Spontaneously Hypertensive Rats

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Received: 11-07-2011 -- Accepted: 12-11-2012 -- Published (online): 01-03-2013

ABSTRACT

Experiments were performed to determine the influence of exercise training by swimming on cardiovascular autonomic control and renal morphology in spontaneously hypertensive rats (SHR) and Wistar-Kyoto (WKY) rats. Sedentary normotensive (SN), trained normotensive (TN), sedentary hypertensive (SH), and trained hypertensive (TH) rats were included in this study. Arterial pressure (AP), heart rate (HR), means of power spectral analysis of HR (HRV) and systolic AP variability (SAPV) were recorded in baseline conditions. Following, the HR baroreflex and autonomic tonus control were assessed. At the end, all animals were euthanized and their kidneys were excised to evaluate renal damage. Resting bradycardia was observed in TH and TN rats compared with their respective sedentary animals ($p < 0.05$). Exercise training attenuated AP in TH vs. SH ($p < 0.001$). The LF component of HRV and SAPV were lower in TH than SH ($p < 0.05$). The LF/HF relation was lower in TH than SH and SN ($p < 0.05$). TN and TH rats showed a sympathetic tonus reduction in comparison to SN and SH rats ($p < 0.001$). The TH presented an increased vagal tonus compared to SH ($p < 0.05$). Exercise training improved baroreflex control of HR in TH group versus SH ($p < 0.05$). The TH showed a lower number of sclerotic glomeruli compared to SH ($p < 0.005$). The exercise training decrease the glomerular indexes in TN and TH ($p < 0.05$). Further analysis showed a significant correlation between sympathetic nervous activity and AP levels ($p < 0.05$). A positive association was also found between sympathetic nervous activity and glomerular index ($p < 0.05$). Therefore, the exercise training reduces AP and attenuates renal damage. In addition, the attenuation of renal injury was associated with lower sympathetic activity. These findings strongly suggest that exercise training may be a therapeutic tool for improving structure and renal function in hypertensive individuals.

Key words: Exercise training, hypertension, cardiovascular autonomic dysfunction, glomerulosclerosis, renal damage.

Key Points

- Endurance training.

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