

Effects of enriched-potassium diet on cardiorespiratory outcomes in experimental non-ischemic chronic heart failure

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Abstract

Background: Chronic heart failure (CHF) is a global health problem. Increased sympathetic outflow, cardiac arrhythmogenesis and irregular breathing patterns have all been associated with poor outcomes in CHF. Several studies showed that activation of the renin-angiotensin system (RAS) play a key role in CHF pathophysiology. Interestingly, potassium (K⁺) supplemented diets showed promising results in normalizing RAS axis and autonomic dysfunction in vascular diseases, lowering cardiovascular risk. Whether subtle increases in dietary K⁺ consumption may exert similar effects in CHF has not been previously tested. Accordingly, we aimed to evaluate the effects of dietary K⁺ supplementation on cardiorespiratory alterations in rats with CHF. Methods: Adult male Sprague–Dawley rats underwent volume overload to induce non-ischemic CHF. Animals were randomly allocated to normal chow diet (CHF group) or supplemented K⁺ diet (CHF+K⁺ group) for 6 weeks. Cardiac arrhythmogenesis, sympathetic outflow, baroreflex sensitivity, breathing disorders, chemoreflex function, respiratory–cardiovascular coupling and cardiac function were evaluated. Results: Compared to normal chow diet, K⁺ supplemented diet in CHF significantly reduced arrhythmia incidence (67.8 ± 15.1 vs. 31.0 ± 3.7 events/hour, CHF vs. CHF+K⁺), decreased cardiac sympathetic tone (Δ HR to propranolol: -97.4 ± 9.4 vs. -60.8 ± 8.3 bpm, CHF vs. CHF+K⁺), restored baroreflex function and attenuated irregular breathing patterns. Additionally, supplementation of the diet with K⁺ restores normal central respiratory chemoreflex drive and abrogates pathological cardio-respiratory coupling in CHF rats being the outcome an improved cardiac function. Conclusion: Our findings support that dietary K⁺ supplementation in non-ischemic CHF alleviate cardiorespiratory dysfunction. © 2021, The Author(s).

Author keywords

Autonomic imbalance; Breathing disorders; Chemoreflex function; Heart failure; Potassium supplemented diet