TACSM Abstract

Maximal Isometric Contraction in Skeletal Muscle of Endurance Trained Rats with Heart Failure

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ABSTRACT

Heart failure (HF) leads to debilitating skeletal muscle dysfunction and atrophy, with exercise tolerance (ET) remaining a crucial indicator of clinical, practical, and mortality-based outcomes. To simulate these comorbidities, monocrotaline (MCT) is a pharmacological agent typically used to aid in replicating experimental models of right ventricle HF. **PURPOSE:** To investigate the viability of moderate-intensity aerobic training to preserve skeletal muscle function and ameliorate muscle atrophy in MCT-induced HF. **METHODS:** Thirty 8-week-old male Wistar rats were randomly divided into sedentary (SED) or trained groups (EX; 30min/day treadmill running sessions, 5 days/wk, for 4 weeks) at 60% intensity determined by a maximal endurance test, in which each condition received a single dose of either MCT (60 mg/kg; HF + SED; HF + EX) or equivalent saline solution (SS + SED; SS + EX). Before and after exercise training, in vivo plantar flexor maximal isometric contractions were performed to assess muscle function at 10, 60, and 120Hz. ET was assessed using a maximal endurance test before and after exercise training, respectively. Separate two-way ANOVAs were used to evaluate significance at a level of p<.05. **RESULTS:** Both HF + SED (p=.0016; 10.7±3min) and HF + EX (p<.0001;10.8±3.7min) showed significantly reduced ET versus their controls (17±3.4min and 23.5±7.3min for SS + SED and SS + EX, respectively), wherein endurance training was unable to mitigate this loss. Assessment of muscle function showed a decrease in torque output at 60Hz only in HF + SED animals (p=.0224; 154.6±5.9Hz), but not HF + EX relative to their controls (181.3±29.8Hz for SS + SED). Contrariwise, torque at 10 and 120Hz did not statistically differ between groups (p>.05). Similar differences were also found in the mass of gastrocnemius-soleus complex, wherein both HF + SED (p=.0047; 2.13±0.32g) and HF + EX (p=.0461; 2.11±0.29g) saw diminished muscle mass when compared to their parallel controls (2.66±0.15g and 2.52±0.25g for SS + SED and SS + EX, respectively). **CONCLUSION:** Although HF animals saw a significant reduction in skeletal muscle mass and concomitant function, endurance training remains a potentially therapeutic intervention by providing a partial protective effect on overall skeletal muscle health.