Feasibility and benefits of a high intensity eccentric interval cycling training for sedentary healthy people

benoit vandenbroeck[1]
Jean-François KAUX[1] and Stéphanie HODY[1]
[1] Department of Physical Activity and Rehabilitation Sciences, University of Liege and University Hospital of Liege, Liege, Belgium

Introduction: Elderly individuals are prone to physical deconditioning, affecting functional capacities and quality of life. Eccentric training (ET) is emerging as an efficient strategy to counteract this phenomenon because of its capacity to develop higher forces for a lower metabolic cost than concentric training (CT).

Purpose: We aimed to examine the feasibility of a high intensity ET and to compare its efficiency in improving muscle strength, functional ability, and aerobic capacities with a CT.

Methods: 18 healthy adults (61yrs) were assigned (simple-randomization) to ET (n=10) and CT (n=8) groups and performed twice-a-week eccentric and concentric interval cycling training for 12 weeks. The intensity ranged from 120% to 135% of the concentric maximal aerobic power (cMAP) for ET, and from 80% to 90% of the cMAP for CT. Quadriceps maximal isometric force (MIF), balance error scoring system (BESS), ten times sit to stand test (TTSST), time up and go, 6 minutes walking test (6MWT), cMAP and maximal oxygen consumption (VO2max) were evaluated before and after each protocol. The rate of perceived exertion (RPE), heart rate (HR), cognitive demand and muscle soreness were monitored over the training.

Results: During the training, ET showed lower HR and RPE, and higher cognitive demand than CT, without onset of soreness in both groups. ET and CT induced functional gains (Wilcoxon-test; $p<0.05$) regarding the MIF (+19%; +28%), BESS score (+21.25%; +20.9%), TTSST (+13%; +5%), and 6MWT (+6.12%; +2.71%), without difference between trainings. However, only CT provided a sufficient stimulus for MAP and VO2max improvements.

Conclusion: Our results demonstrated the feasibility and effectiveness of a high intensity ET in improving muscle and functional capacities. Its low metabolic cost makes it an efficient modality to counteract deconditioning and sarcopenia in frail people and chronic pathologies. Its higher cognitive demand appears as an interesting feature to be studied.