TACSM Abstract

Cardiorespiratory Responses during Aquatic Treadmill Exercise and Land Treadmill Exercise in Adults with Diabetes

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ABSTRACT

The purpose of this study was to compare the effect of aquatic treadmill (ATM) exercise to land treadmill (LTM) exercise in adults with type 2 diabetes. Five participants with type 2 diabetes (T2D group; 4 females, 1 male; age = 51±6 years; height = 170±7 cm; weight = 96±24 kg; body fat = 31.6±2.2%) and five participants without type 2 diabetes (control group; 4 females, 1 male; age = 51±6 years; height = 170±6 cm; weight = 71±15 kg; body fat = 26.8±4.6%) completed the study. Protocols for both ATM exercise and LTM exercise began at 2 mph with 0% grade and increased by 1 mph after 5 minutes at each stage. Termination occurred after participants completed the protocol or reached 85% of heart rate reserve. Heart rate, absolute and relative VO_2, and systolic and diastolic blood pressure were measured at rest and during steady-state exercise at each intensity. Mean arterial pressure (MAP) was calculated. A 2 x 2 x 3 Mixed Factorial ANOVA and Bonferroni post hoc test with a significance level of .0125 were used. There was a significant difference ($p<.0125$) in all measures with an increase in intensity for each mode of exercise. Heart rate response was significantly different at 2 mph and 4 mph between LTM exercise and ATM exercise for those with type 2 diabetes (LTM @ 2 mph: 101±12 bpm vs. ATM @ 2 mph: 92±8 bpm, $p<.0125$; LTM @ 4 mph: 140±18 bpm vs. ATM @ 4 mph: 123±12 bpm, $p<.0125$) and those without type 2 diabetes (LTM @ 2 mph: 91±10 bpm vs. ATM @ 2 mph: 82±10 bpm, $p<.0125$; LTM @ 4 mph: 125±15 bpm vs. ATM @ 4 mph: 113±12 bpm, $p<.0125$). There was a significant difference between the relative VO_2 of the two groups at 4 mph while performing the land treadmill exercise (T2D: 14.1±1.4 ml/kg/min vs. control: 18.4±1.6 ml/kg/min, $p<.0125$). There was no difference in absolute VO_2 between participant groups or modes of exercise. Those with type 2 diabetes had an increased MAP versus those without type 2 diabetes while performing the land treadmill exercise at 2 mph (T2D: 93±3 mmHg vs. control: 81±5 mmHg, $p<.0125$). Although there is some evidence for the varying effects of ATM and LTM exercise when comparing those with type 2 diabetes and those without type 2 diabetes, heart rate, VO_2, and MAP respond similarly in both groups during ATM and LTM exercise at most treadmill speeds.