TACSM Abstract

Cardiorespiratory and Biomechanical Changes with Hippotherapy in Children with and without Cerebral Palsy

B Rhett Rigby[1], Adam R Gloeckner[1], Zacharias Papadakis[1], Annie A Bane[1], Jeff S Forsse[1], Ashley E Bird[1], Taylor R Willard[1], Dyana L Bullinger[2], Rebeca R Rogers[2], Kyle D Biggerstaff[2], and Peter W Grandjean*

[1]Baylor Laboratories for Exercise Science and Technology; Department of Health, Human Performance, and Recreation; Baylor University; Waco, TX

[2]Exercise Physiology Laboratory; Department of Kinesiology; Texas Woman's University; Denton, TX

Category: Doctoral

Advisor / Mentor: Grandjean, Peter (Peter_Grandjean@baylor.edu)

ABSTRACT

Hippotherapy utilizes the rhythmic movement of the horse to improve functional abilities and quality of life of individuals with neurological impairments. Little is known regarding the changes in body segment kinematics and cardiovascular responses of the rider due to the therapy. A change in the magnitude of pelvic displacement (PD) may allow those who use the therapy to more easily perform activities of daily living. Also, reduced cardiovascular stress to similar physical activities may be an important, but overlooked, therapeutic benefit of hippotherapy. The purpose of this study was to characterize PD and cardiorespiratory (CR) responses to simulated horseback riding (SHR) and walking in children with minimal-to-moderate spastic cerebral palsy (CP) before and after eight weeks of hippotherapy. These results were compared to healthy children undergoing the same protocol. Our hypothesis was that eight weeks of hippotherapy would elicit an increase in PD and reduced CR response during SHR and treadmill walking in children with CP. Eight children with CP (1 female, 7 males; 10 $\pm$ 4 years of age; height 54 $\pm$ 10 in; weight 70.2 $\pm$ 34.3 lb) and eight healthy children (5 females, 3 males; 11 $\pm$ 2 years of age; height 59 $\pm$ 6 in; weight 104.6 $\pm$ 33.4 lb) underwent similar hippotherapy training. Before and after the intervention, both groups completed simulated horseback riding (SHR) at an intensity approximating a fast walk (0.65 Hz) and walked on a treadmill (1 mph, 0% grade). PD along the anterior-posterior, superior-inferior and medial-lateral axes and HR, VO_2, V_E, SBP, and DBP were measured at steady-state exercise. Mean arterial pressure and rate pressure product were calculated. Prior to hippotherapy, PD was increased in healthy children ($p = 0.032$) but CR responses were similar in both groups during SHR ($p > 0.05$ for all). Treadmill walking elicited greater PD and CR responses compared to SHR in both groups and significantly greater responses in CP compared to healthy children ($p < 0.05$ for all). Eight weeks of hippotherapy did not alter acute responses. Our findings demonstrate treadmill walking at 1 mph elicits greater PD and CR responses than SHR. The walking responses are more pronounced in children with CP compared to healthy children. Observable cardiovascular adaptations or kinematic changes in children with CP are unaffected by short-term hippotherapy training.

TEXAS CHAPTER
american college of sports medicine