

PETERSEN, JENNIFER L., Ph.D., DECEMBER 2015

Education, Health and
Human Services

EFFECTS OF BRIEF AQUATIC EXERCISE IN MULTIPLE SCLEROSIS ON
MOBILITY AND FUNCTION (196 pp.)

Director of Dissertation: Angela L. Ridgel, Ph.D.

BACKGROUND: Multiple sclerosis is a demyelinating disorder that impacts mobility and function. The benefits of exercise on multiple sclerosis symptoms have been demonstrated. Exercise is proven to increase cerebral blood flow, and improve oxygen utilization which may potentially help in counteracting the hypometabolic component of multiple sclerosis. However, barriers to exercise in people with multiple sclerosis limits their participation in long term exercise. **PURPOSE:** The purpose of this investigation was to determine the effects of a 7 consecutive day aquatic aerobic exercise intervention on mobility, fitness, body composition, and self-efficacy. A further purpose of this investigation was to determine the effects of the exercise intervention on cerebral oxyhemoglobin, deoxyhemoglobin, and % tissue saturation index (%TSI). **METHODS:** Twenty-one individuals diagnosed with multiple sclerosis were assigned to the exercise group or the non-exercise group. Both groups participated in a pretest and post-test separated by 7 days. The pre/post-test anthropometric measures included height, weight, BMI, hip and waist circumference measures. In addition, blood pressure, mean arterial pressure, body temperature, and resting heart rate were recorded. Mobility was assessed through the timed up and go test (TUG) and the 25-foot walk test (T25-FW), and fitness was assessed through the 2-minute step test. The Multiple Sclerosis Self-Efficacy questionnaire was used to assess self-efficacy. Oxyhemoglobin, deoxyhemoglobin, total

hemoglobin and % TSI were measured using Near-Infrared Spectroscopy (NIRS). The non-exercise group was asked to maintain their lifestyle during the 7 days between the pretest and post-test, while the exercise group participated in 1 hour of aquatic aerobic exercise for each of the 7 days between the pretest and post-test. Change scores were calculated for each variable of the pretest and post-test and the non-exercise and exercise groups were compared using independent samples t-tests for each of these scores.

RESULTS: Although there were no statistically significant differences between the exercise and non-exercise groups for mobility, fitness, body composition, self-efficacy, or cerebral oxygenation, there were small clinically meaningful improvements. In mobility (T25-FW), 8/11 exercise participants improved while only 1/9 in the non-exercise group showed improvement. Similar small improvements were demonstrated in the two minute step test used to assess fitness. Cerebral oxygenation also showed improved blood flow through improved oxyhemoglobin and total hemoglobin and improved oxygen utilization through the deoxyhemoglobin response. **CONCLUSION:** Seven consecutive days of moderate intensity exercise can produce small clinically meaningful changes through improved mobility, fitness, self-efficacy and cerebral oxygen utilization.