

The Effects of Slow Deep Breathing on Measures of Microvascular and Autonomic Function in an Irritable Bowel Syndrome Population

MARY K. JUREK, HANNAH N. SEAVEY, MEREDITH E. GUIDRY, EMILY L. SLOMKA,
and STACY D. HUNTER

Cardiovascular Physiology Laboratory; Department of Health and Human Performance;
Texas State University; San Marcos, TX

Category: Undergraduate

Advisor / Mentor: Hunter, Stacy D (s_h393@txstate.edu)

ABSTRACT

Irritable Bowel Syndrome (IBS) is a functional disorder linked to disruptions in autonomic nervous system regulation, which could impair vascular homeostasis. Studies have shown that slow, deep breathing reduces muscle sympathetic nerve activity and arterial stiffness; however, its effects on autonomic regulation in adults with IBS have not been previously investigated. Moreover, the effects of breathing on microvascular endothelium function are unknown. **PURPOSE:** To investigate the effects of slow, deep breathing on measures of autonomic function and microvascular endothelial function in adults with IBS. **METHODS:** Adults (ages 18-65 years) with a formal diagnosis of IBS were enrolled and randomized to 4-week controlled breathing or time-control conditions. The experimental group followed a 20-minute slow, deep breathing video 4 to 6 days per week while the control group maintained their regular activity. To assess autonomic function, heart rate variability (HRV) and exercise heart rate recovery (HRR) were measured at baseline and week 4. The HRV test was accompanied by respiration rate measurements to ensure no significant deviations in respiration occurred between assessments as this could impact HRV. Exercise HRR was assessed 30, 60, and 120 seconds following a Balke treadmill VO_2 max test. Laser Doppler flowmetry was assessed at baseline (33°C) and in response to local heating up to 43.5°C while blood pressure was measured throughout for the calculation of cutaneous vascular conductance (CVC). **RESULTS:** Of the 14 participants enrolled, 12 ($n=6$ for control and experimental groups) completed the study. At baseline, age ($p = 0.47$) and body mass index ($p=0.14$) were similar between groups. Respiration rate was similar between HRV assessments in both groups. In the experimental group, %CVC max significantly increased ($p = 0.027$) at week 4 while HRR was unchanged. A tendency toward a time by group interaction was observed for HRV low frequency to high frequency (LF/HF) ratio ($p = 0.066$) with slight reductions in the breathing group and increases in the control group. In the control group, %CVC max and HRR were unaltered, though HRR at 120 seconds tended to improve ($p=0.08$). **CONCLUSIONS:** Preliminary results from this ongoing study suggest that microvascular endothelial function can improve with 4 weeks of slow, deep breathing exercises in adults with IBS. These alterations in vascular function were unaccompanied by significant changes in autonomic function though trends were observed in HRV. Results show that slow, deep breathing is a viable alternative to physical exercise for improving microvascular function. Findings also suggest that this intervention could result in improved sympathovagal balance in adults with IBS and potentially other individuals with functional disorders.