Proceedings Paper:
Taylor, BJ orcid.org/0000-0001-5229-941X, O'Keeffe, I and Hammond, JL (2017) Effect of Acute Expiratory Loading on Abdominal Muscle Function and Exercise Tolerance in Healthy Humans. In: Medicine & Science in Sports & Exercise. ACSM Annual Meeting, 30 May - 03 Jun 2017, Denver, CO, USA. Lippincott, Williams & Wilkins , p. 17.

https://doi.org/10.1249/01.mss.0000516857.65846.3e

Effect of Acute Expiratory Loading on Abdominal Muscle Function and Exercise Tolerance in Healthy Humans

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Heavy-intensity whole body exercise sustained to the limit of tolerance elicits fatigue of the diaphragm and expiratory abdominal muscles. Such respiratory muscle fatigue is likely involved in exercise limitation in healthy humans. Acute submaximal inspiratory muscle loading causes a transient increase in diaphragm excitability and inspiratory muscle strength, and may enhance subsequent exercise performance. Whether loading of the expiratory muscles has a similar ergogenic effect is unknown. **PURPOSE.** To determine the effect of acute expiratory muscle loading on expiratory abdominal muscle function and exercise tolerance in healthy humans. **METHODS.** Using a single-blind, placebo-controlled design, nine male subjects [$\dot{V}O_{2peak}$ = 50.1 ± 3.8 (SD) ml·kg^{-1}·min^{-1}] cycled at ≥90% of $\dot{V}O_{2peak}$ to the limit of tolerance after 1) 2 × 30 expiratory efforts against a pressure-threshold load of 40% maximal expiratory pressure (MEP) (EML-EX), and 2) 2 × 30 expiratory efforts against a pressure-threshold load of 10% MEP (SHAM-EX). Abdominal muscle function was assessed before and after expiratory muscle loading and 5 min after exercise by measuring 1) the gastric pressure response to maximal voluntary expiratory efforts (Pga_{max}), and 2) gastric twitch pressure (Pga_{tw}) in response to magnetic stimulation of the thoracic nerve roots. **RESULTS.** From before to after expiratory muscle loading in EML-EX, there was no change in non-potentiated Pga_{tw} (30.3 ± 10.6 vs. 32.9 ± 10.3 cmH_2O, P = 0.232), potentiated Pga_{tw} (36.3 ± 8.0 vs. 38.9 ± 8.1 cmH_2O, P = 0.079), or Pga_{max} (190 ± 44 vs. 202 ± 45 cmH_2O, P =0.611). Similarly, there was no change in expiratory abdominal muscle function from pre- to post-expiratory muscle loading in SHAM-EX. Exercise time to the limit of tolerance was not different in EML-EX vs. SHAM-EX (480 ± 132 vs. 489 ± 120 s, P = 0.792). The severity of exercise-induced abdominal muscle fatigue was not different in EML-EX vs. SHAM-EX (potentiated Pga_{tw} −25 ± 12 vs. –22 ± 9%, P = 0.376). Perceptual ratings of dyspnoea and leg discomfort (Borg CR10) were not different at min 1, min 3, and at end-exercise during EML-EX and during SHAM-EX (P > 0.05). **CONCLUSION.** Acute expiratory muscle loading does not improve expiratory abdominal muscle function or subsequent exercise tolerance in healthy humans.

Supported by The Physiological Society.