RehabMove 2018: EFFECT OF RESPIRATORY MUSCLE TRAINING ON EXERCISE CAPACITY AND RESPIRATORY MECHANICS IN ATHLETES WITH TETRAPLEGIA

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PURPOSE: To examine whether six weeks combined inspiratory and expiratory respiratory muscle training (RMT) improves peak exercise capacity and respiratory mechanics during sub-maximal exercise in wheelchair rugby athletes with tetraplegia.

METHODS: Six athletes (5M/1F, 33±5 years) were assessed for maximal, sub-maximal and field-based exercise performance pre and post six-week pressure-threshold RMT, and again following six-weeks of no RMT. During each testing session, athletes first completed a ramped arm-ergometer exercise test to exhaustion for the determination of peak work rate and peak oxygen uptake. Following a 30 minute break, athletes completed a sub-maximal arm-ergometer test at 20, 40, 60, and 80% of peak work rate. Inspiratory capacity maneuvers were performed in the final minute of each stage to determine end-expiratory lung volume (EELV) and calculate end-inspiratory lung volume (EILV). Breath-by-breath cardiopulmonary indices were recorded throughout both exercise tests. On a separate day, athletes were assessed for time to complete a field-based 20x20 metre repeated sprint test.

RESULTS: Following RMT, there were increases in peak work rate (69±22 post vs. 60±20 W pre, p=0.03), oxygen uptake (20.3±5.9 vs. 17.6±5.0 mL/kg/min, p=0.04), and minute ventilation (54±18 vs. 46±12 L/min, p=0.03). Dynamic hyperinflation was present during all tests as evidenced by an increase in EELV with increasing exercise intensity; however, during post-RMT testing both EELV and EILV were significantly lower than pre-RMT throughout exercise ($p<0.05$). At follow-up, no indices were different from post-RMT. Field-based repeat sprint performance was unchanged by RMT.

DISCUSSION:RMT enhances exercise capacity in athletes with tetraplegia. Whether this is due to an increased peak ventilation or the circulatory benefits of an enhanced respiratory muscle pump, lower operating lung volumes, and/or an attenuation of the respiratory muscle metaboreflex remains to be determined.