

European Respiratory Society Annual Congress 2013

Abstract Number: 4236

Publication Number: P1921

Abstract Group: 4.1. Clinical respiratory physiology, exercise and functional imaging

Keyword 1: COPD - management **Keyword 2:** Exercise **Keyword 3:** Rehabilitation

Title: Physiological responses to Tai Chi in stable patients with COPD

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Body: Background: The physiological value of Taichi as a useful mode of pulmonary rehabilitation in COPD remains poorly understood, especially in comparison with the generally accepted threshold of 60% of maximal load which is considered necessary for pulmonary rehabilitation. Methods: Taichi exercise and constant treadmill exercise at 60% of maximal load were performed in random order in 11 patients with COPD. Diaphragm EMG and esophageal pressure, oxygen uptake, minute ventilation, respiratory rate were continually measured during exercise. Inspiratory capacity was also measured before and immediately after exercise. Results: Mean diaphragm EMG and esophageal pressure over the Taichi exercise were similar to those over the treadmill exercise ($113\pm 57\mu\text{V}$ vs $119\pm 56\mu\text{V}$ for diaphragm EMG and $21.4\pm 7.7\text{ cm H}_2\text{O}$ vs $23.8\pm 7.0\text{ cm H}_2\text{O}$ for esophageal pressure). Tidal volume at the end of exercise after Taichi was significantly higher than that after treadmill walking ($1.2\pm 0.5\text{ L}$ vs $1.0\pm 0.3\text{ L}$) while respiratory frequency at the end of treadmill exercise ($30\pm 6\text{ times/m}$) was higher than that at the end of Taichi ($25\pm 4\text{ times/m}$), although oxygen uptake was not significantly different between Taichi and treadmill exercise. A fall in inspiratory capacity after treadmill exercise was larger than that after taichi exercise (0.34 vs 0.19 L). Conclusions: Taichi produced a similar degree of work as constant rate treadmill exercise at 60% of maximal load; but Taichi was characterized by a greater increase in tidal volume less increase in respiratory rate and dynamic hyperinflation. Taichi is useful for pulmonary rehabilitation in patients with COPD.