

Title: Inspiratory muscle training decreases ankle proprioceptive use during balance control in patients with COPD.

Background: Balance deficits are often reported in patients with COPD. Proprioception is a primary sense for balance control. Patients with COPD, especially those with inspiratory muscle weakness, predominantly use ankle relative to back muscle proprioception during balance control. This leads to postural instability during challenging postural conditions.

Aim: To observe the effect of inspiratory muscle training (IMT) on proprioceptive use during balance control in individuals with COPD.

Methods: Eight patients with COPD (FEV1/FVC $49 \pm 16\%$) completed 8 weeks of IMT, either at 50% (n=6; IMT group) or 10% of P_Imax (n=2; control group). Centre of pressure (COP) displacement in response to muscle vibration during upright standing without vision was determined. Local vibration (60Hz, 0.5mm, 15s), a powerful stimulus for muscle spindles, was applied on ankle or back muscles to evaluate proprioceptive use during balance control. Large postural sways in response to vibration indicate high reliance on proprioceptive signals from the vibrated muscle.

Results: The IMT group (+13% in P_Imax) showed a decreased postural sway during ankle muscle vibration (COP Δ -23%), which was not found in the control group (+2% in P_Imax) (COP Δ +11%), resulting in a significant interaction (group X time) effect (F=6.05, p=0.049). No difference in postural sway during back muscle vibration was observed between both groups and pre/post IMT (F=0.12, p=0.744).

Conclusion: This interim analysis shows that IMT decreased reliance on ankle proprioception during balance control in patients with COPD. A potential mechanism is that IMT enhanced the postural contribution of the diaphragm to balance control.