Balance is Impaired in People with Chronic Obstructive Pulmonary Disease
Michelle D. Smith, Angela T. Chang, Helen E. Seale, James R. Walsh, Paul W. Hodges

Introduction
Recent evidence has suggested that individuals with COPD have an increased risk for falls.
Mediolateral (ML) control affects balance more than anteroposterior (AP) control.
ML balance is dependent on movement at the hips/trunk and may be compromised in COPD patients.

Purpose
To determine if an increase in respiratory demand would compromise balance in individuals with COPD more than healthy individuals.

Methods
12 individuals with COPD and 12 healthy individuals
7 males & 5 females between the ages of 53-80 per group
Inclusion criteria: FEV1 of less than 50% of predicted values, less than 25% change in FEV1 after bronchodilatation, and not having an exacerbation of their COPD in the last 2 months.
Exclusion criteria: asthma, cardiac conditions, hypertension, lower limb injury, vestibular problems, neurological injury or disease, urinary incontinence, difficulty understanding English or required the use of gait aids or home oxygen.

Measurements
were assessed using ground reaction forces with a force plate and inclinometers.
Subjects stood on force plate with eyes open, eyes closed, on high density foam, and on a short base after they participated in upper extremity exercise to increase respiratory demand.
Inclinometers: measured angular motion at the hips & spine
Upper extremity exercises (arm crank ergometer or repetitive shoulder flexion) were performed to challenge the respiratory system before balance activities were performed. Exercise was stopped when subjects with COPD reported “very severe” breathlessness and was continued to maintain “moderate” to “very severe” breathlessness throughout balance measurements.

Results
Subjects with COPD had increased ML center of pressure displacement compared to healthy individuals during all balance conditions.
There was no significant difference in AP movement between groups.

Discussion
Balance in the ML direction is maintained by torques at the hip and trunk. Increased ML control of balance may be due to inadequate contribution of the trunk/diaphragm and dyspnea during balance activities and ADL’s.
Subjects with COPD were able to maintain AP control of balance similarly to subjects without COPD in all balance tasks by increasing motion at the hips. When a balance task became more difficult, subjects with COPD were not able to accommodate for ML balance as well as healthy individuals.
Decreased balance in the ML direction has been closely related to an increased risk for falls.

Clinical Relevance
It is important for physical therapists to take extra precautions when performing activities that could cause a COPD patient to lose their balance (walking, stair climbing, etc).
Patients may be at an increased risk for falls or injury during therapy if physical therapists do not provide appropriate guarding during their treatments.
Incorporating balance activities into the rehabilitation of patients with COPD will improve their overall treatment and outcome.

Conclusions
Further research is needed to explore the relationship between increased trunk muscle activity and compromised postural control in individuals with COPD.
There is a need to look at the effectiveness of intervention programs on ML balance and incidence of falls in individuals with COPD.

Article #1 and Evidence
• Patients with COPD have decreased balance compared to healthy individuals. Individuals with COPD had reduced performance in all subcomponents of balance It showed a decrease in balance scores on 2 balance assessments (Balance Evaluation Systems Test and Berg Balance Scale) which lead to findings that persons with COPD have marked deficits in biomechanics, transitions, and gait. Also, reaction time for balance recovery was delayed.

Article #2 and Evidence
Citation: Leung RWM, Alison JA, McKenough ZJ, Peters MJ. A study design to investigate the effect of short-form Sun-style Tai Chi in improving functional exercise capacity, physical performance, balance and health related quality of life in people with Chronic Obstructive Pulmonary Disease (COPD) Contemporary Clinical Trials. 2011;32:267-272
• Subjects will perform a variety of balance tests such as tandem and single leg stance, along with other functional activities to see whether or not Sun-style Tai Chi will benefit overall function, including balance, exercise capacity, and quality of life in COPD patients. This study has only been described, not performed at this time so no results were presented.

Summary
After reviewing 3 articles relating to individuals with COPD and balance, it is apparent that there is a relationship between decreased balance and the disorder. Some clinical findings include decreased ML control of balance, increased angular motion at the hips, marked deficits in biomechanics, transitions, and gait, and delayed reaction time when losing balance in individuals with COPD.

Presented by: Jessica King, DPT Student