Dynamic stability association with cost of transport is different in patients with COPD compared to healthy controls

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INTRODUCTION

• Chronic obstructive pulmonary disease (COPD) is a chronic lung disease that affects not only the lungs but also the neuromuscular system, leading to deficits in functional performance and increased fall risk [1,2].
• In this situation, increased muscle activity is needed to provide safe walking patterns, stability while walking.
• This increase in muscle activity leads to increased metabolic cost, i.e., using more oxygen to complete the task.

PURPOSE:
• the main objective of this study was to investigate the relationship between walking stability and metabolic cost in patients with COPD in comparison with age-matched controls.

RESULTS

• MOS variability in AP direction was increased in patients with COPD compared to healthy older adults (Fig. 3).
• For both groups, increased mean MOS AP while walking faster was found in comparison with slow and preferred speed conditions (p=0.001). In addition, when walking at a slower speed, MOS variability in AP direction was increased in comparison with fast (p<0.0001) and preferred speed (p=0.004).
• Increased mean MOS ML was found for both groups while walking at preferred speed compared to fast speed (p=0.007).
• The mean MOS AP had an inverse association with COT in both groups for all speeds (Tab. 2). People with lower margins of stability (higher chance of losing balance), had higher COT while walking. However, the relationship was stronger in healthy subjects and weaker in patients with COPD.

METHODS

• Subjects (Tab. 1) were instructed to walk on a treadmill at three different speeds including preferred, fast (+20% preferred) and slow (-20% preferred) speeds, while motion capture data was recorded (Fig. 1).
• Margin of stability (MOS) mean and variability (i.e., standard deviation) at each heel strike was calculated for each of the walking trials [4](Fig. 2).
• Energy cost of transport (COT) was calculated by subtracting the energy consumption values at standing from walking conditions to achieve net metabolic cost for each condition [3].
• Pearson correlation was used to determine the association between MOS and COT.

DISCUSSION and CONCLUSIONS

• Repeated measures ANOVA (2 groups x 3 speeds) was used to determine differences in groups and between speeds.

REFERENCES