Multimodel inference applied to oxygen recovery kinetics after 6-min walk tests in patients with chronic obstructive pulmonary disease

Florent Baty, Christian Ritz, Signe Marie Jensen, Lukas Kern, Michael Tamm & Martin Brutsche

6-min walk tests (6MWT) are routinely performed in patients with chronic obstructive pulmonary disease (COPD). Oxygen uptake ([Formula: see text]) kinetics during 6MWT can be modeled and derived parameters provide indicators of patients’ exercise capacity. Post-exercise [Formula: see text] recovery also provides important parameters of patients' fitness which has not been extensively investigated in COPD. Several nonlinear regression models with different underlying biological assumptions may be suitable for describing recovery kinetics. Multimodel inference (model averaging) can then be used to capture the uncertainty in considering several models. Our aim was to apply multimodel inference in order to better understand the physiological underpinnings of [Formula: see text] recovery after 6MWT in patients with COPD. 61 patients with COPD (stages 2 to 4) were included in this study. Oxygen kinetics during 6MWT were modeled using nonlinear regression. Three statistical approaches (mixed-effects, meta-analysis and weighted regression) were compared in order to summarize estimates obtained from multiple kinetics. The recovery phase was modeled using 3 distinct equations (log-logistic, Weibull 1 and Weibull 2). Three models were fitted to the set of 61 kinetics. A significant model-averaged difference of 40.39 sec (SE = 17.1) in the time to half decrease of [Formula: see text] level ([Formula: see text]) was found between stage 2 and 4 (p = 0.0178). In addition, the Weibull 1 model characterized by a steeper decrease at the beginning of the recovery phase showed some improvement of goodness of fit when fitted to the kinetics of patients with stage 2 COPD in comparison with the 2 other models. Multimodel inference was successfully used to model [Formula: see text] recovery after 6MWT in patients with COPD. Significant model-averaged differences in [Formula: see text] were found between moderate and very severe COPD patients. Furthermore, specific patterns of [Formula: see text] recovery could be identified across COPD stages.

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